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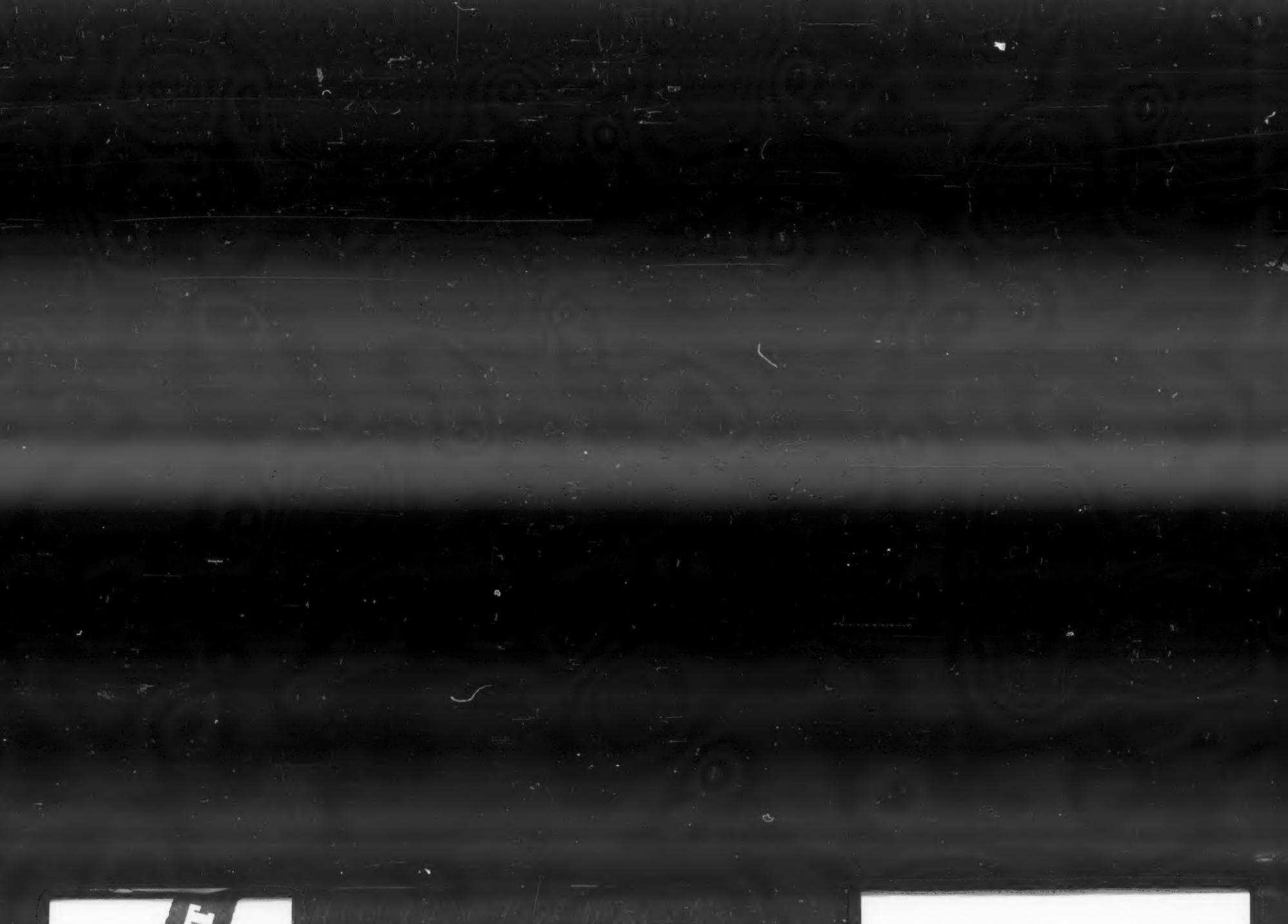

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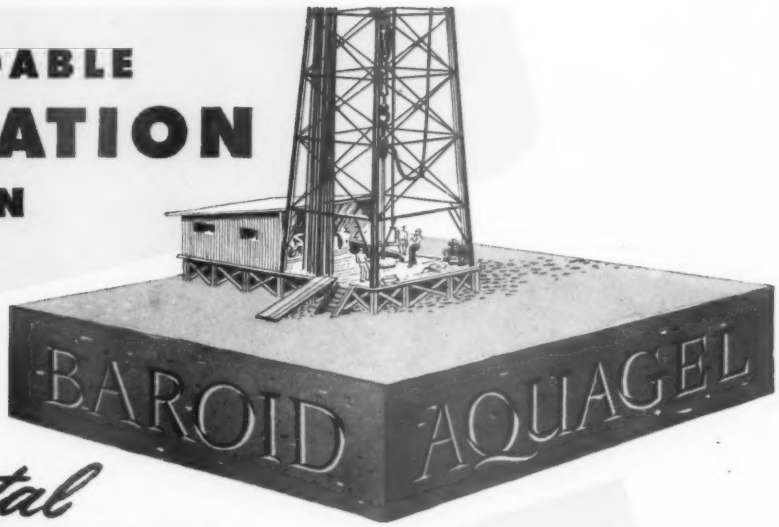

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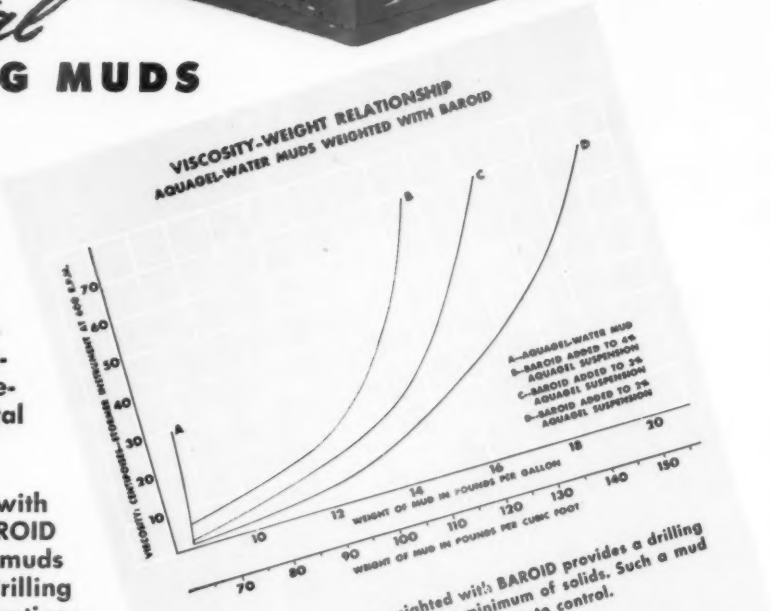

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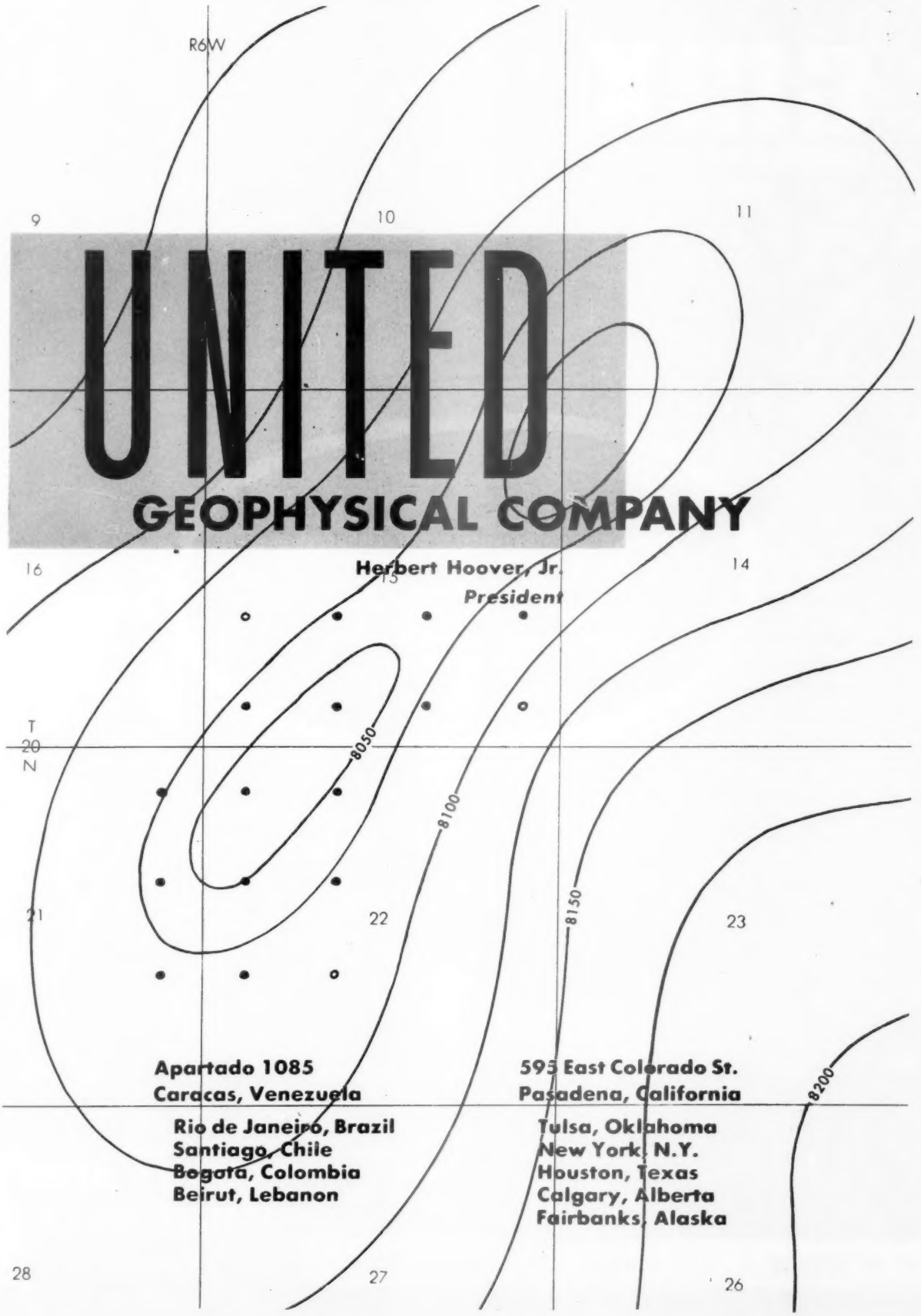

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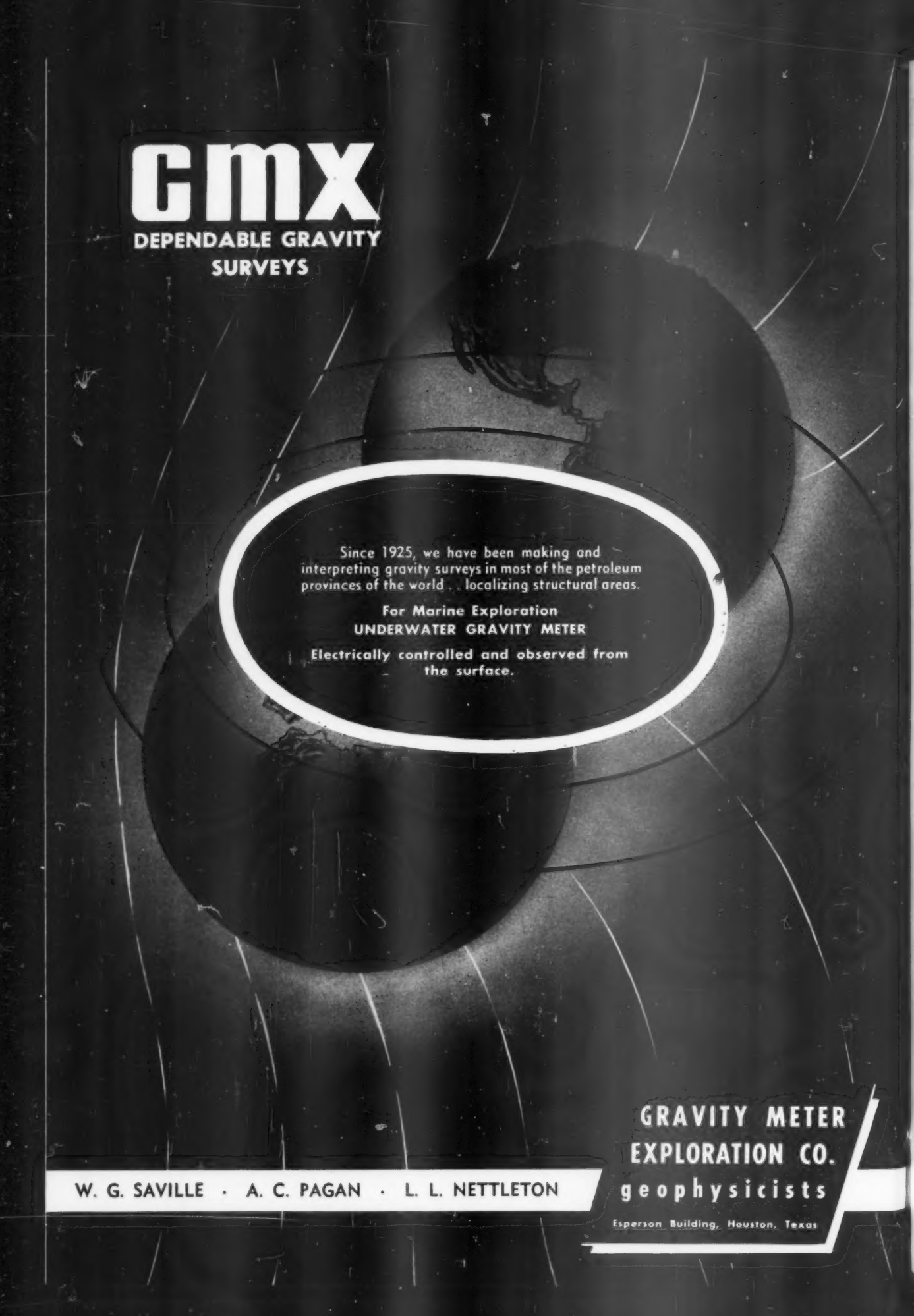
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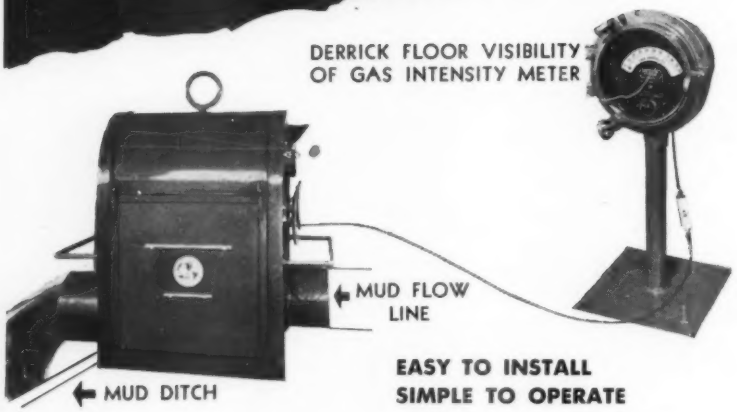

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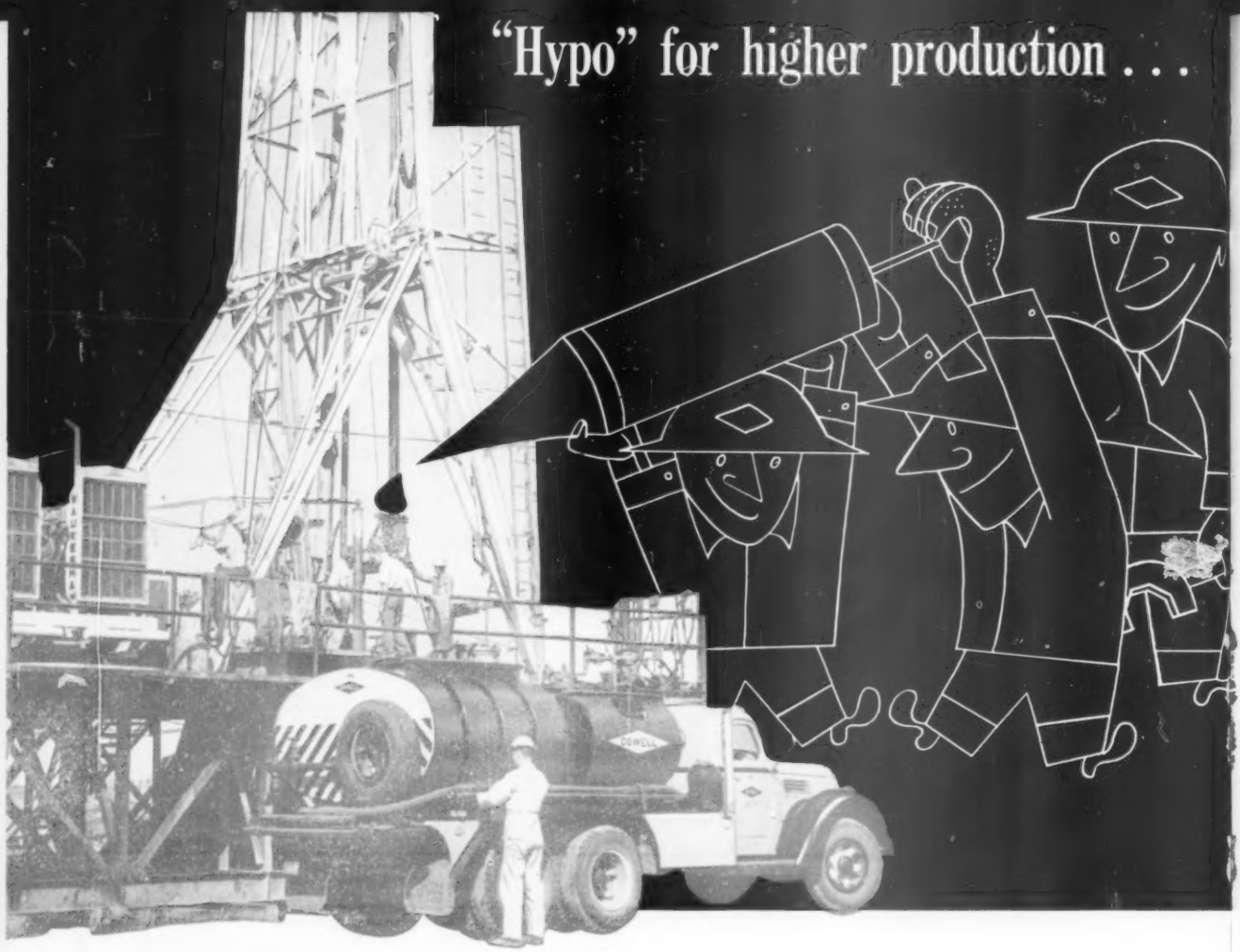

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Editorial Comment

by
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THE branch chairman speaks of engineering specialization – its influence upon aime centralization and publications. He tells of bridges crossed and to be crossed, and would remind you all that the new journal will be the kingpin of a broadened branch program and a real force in strengthening the profession if members will but use it freely to carry opinion and incite action.

THIS issue of the *Journal of Petroleum Technology* climaxes the extended effort of your Petroleum Branch Executive Committee to obtain an AIME publication so dominantly petroleum as to secure wide reader interest, and so frequent in issue as to convey personalized information on Branch and petroleum Local Section activities. The Committee believed that this reader interest, once secured, would be a real force in the shaping of policies for maximum service to the membership. The objectives of the *Journal* are to inform you well and to thereby secure on each issue before the Branch either your support or your articulate opposition.

Our wishes for the *Journal* go even beyond its role in the conduct of AIME affairs to include the ambition that as the first complete petroleum engineering associational publication it will rapidly attain the respect of the industry as a completely independent forum. We feel that the *Journal* is another marker on the route to professional maturity, and will be the progenitor of several others.

You have been informed from time to time of the progress of this development. Now that the *Journal* is a reality you may have questions on the forces leading to its formation, so that few final words of explanation will be in place. Many times in the 78 years since its founding the AIME has reached out to embrace small new groups engineering in the earth, albeit not to bring out ore, or engineering the conversion of minerals with no serious concern about techniques of extracting these minerals from the earth. This succor gave form and eventual strength to the once-weak groups embraced, strengthened the Institute, and added the prestige of great inclusiveness to that of age and character. It also created the great problem of servicing from a central point, and according to a single pattern, an international membership of various and variant technical interest. The passage of years, particularly the last twelve, has demonstrated that the increasing variety and divergence of technologies within Institute borders is a natural and irresistible force, and that the administration of all Institute services from a single point, on a single plan, lacks sensitivity to the particulars of membership requirements. This lack of sensitivity was partly the nature of the organizational plan and partly an evidence of budget limitations, but whatever its cause it was frequently and understandably mistaken for indifference and once caused a near-conviction in petroleum and other circles that the opportunity provided for the individualistic expression of the specialized groups was so inadequate as to shadow the fine opportunity provided by the Institute for communication and association between allied groups.

To allay these doubts the (then) Petroleum Division presented to the Board of Directors in August, 1947, a proposal for revision of petroleum publications. The questions posed by this proposal were recognized as a challenge to the whole Institute structure and were passed to a committee created for the purpose — the H. W. Johnson Committee — for a study that delved into every phase of AIME organization and was summed up in a report endorsing, in general, the Division plan for publications and recommending relaxation of central control where such control was unwieldy and restrictive. The report was followed by some exhausting interpretative efforts and in September, 1948 the Board directed the Branch to assume responsibility for the *Journal*, which we did forthwith. This decision dissolved *Mining & Metallurgy* and *Petroleum Technology* and similarly affected the Mining and Metals Branches. In December the Board budgeted for the engagement of an Assistant Petroleum Branch Secretary, and in January J. B. Alford was engaged for that position and will almost immediately relieve the Secretary of most of the detail of editing the *Journal*.

The plan on which the *Journal* is set up calls for a first section containing editorial matter on Branch and petroleum Local Section activities, such industrial news items as may be particularly relevant to AIME objectives, and non-technical or semi-technical articles deemed to be of interest but disqualified by nature for the Transactions volume. The third section contains the technical papers which will be handled almost exactly as they were in *Petroleum Technology*. All technical papers will be published in the *Transactions* volumes. (The larger page contains twice as much print as the abandoned small size. The 26 pages of T. P.'s in this issue augur a *Transactions* of twice the usual content. This increase denotes an accelerated flow of papers rather than any alteration in the policies for selection.)

The first and third sections aforementioned are edited and printed in Dallas and are entirely subject to Branch control. The second section is edited in the New York office, printed in Philadelphia, and shipped to Dallas for binding. The content of this section is to some extent adjustable to petroleum membership preferences, as the New York staff desires to include only material of interest to the entire membership. This section is common to the Mining and Metals Branch Journals. While it occupies 32 pages in this issue, it is intended that it will ordinarily occupy only 24 pages. The *Journal* is to be placed in the mail in Dallas, on the 15th of each month, in envelopes addressed in New York.

The solicitation of advertising, and its printing, handling

of plates, and billing is a Branch responsibility and will be conducted from the Dallas office. Our hope in this respect is to attain, in probably not less than one nor more than two years, a self-supporting publication.

It is hardly conceivable that there is a worthwhile plan for expansion of the Institute's services to Petroleum Branch members that cannot be furthered by full and skillful use of the *Journal*.

Plans now on hand call for broadening the base of our activities both technically and geographically. Organized Branch activities in such areas as the Rocky Mountains, Illinois Basin and Appalachians seem logical and will be brought about if local support is forthcoming. It is intended that our ties with colleges and universities with petroleum engineering curricula be strengthened. From the technical viewpoint we should encourage the presentation and publication of papers dealing with every phase of petroleum enginering. These should include the application of mechanical equipment, drilling, drilling fluids, natural gas, gasoline and LPG plants, engineering geology, cycling, all forms of secondary recovery, unitization, behavior of reservoir fluids, economics, education, and all other problems confronting us.

Our meetings are, I believe, distinguished by outstanding papers, an earnest, interested audience, good fellowship and social activities of a high order. Increasing participation in our meetings by the ladies adds a pleasant note. The broadening influence of these meetings combats the less desirable influences of engineering specialization. Our goal of scientific statesmanship will be realized sooner if attendance at the meetings continues to increase.

As I complete the year as your Chairman and prepare to turn the office over to Mr. Elkins, three things are uppermost in my mind. First, to make known my gratitude to other Branch officers and committee members, Local Section leaders and committees, and authors and reviewers of papers and reports for their generous service to the Branch program, and to the membership as a whole for many constructive expressions of opinion and encouragement. Second, to publicly inform the AIME Board of Directors that we of the Branch Executive Committee realize the weight and complexity of the problems that have confronted the Board in the past year, and are appreciative of the many recent demonstrations of moral and financial support.

My third desire is of such consequence that its attainment alone will cause me to feel lasting satisfaction from my term. It is that these important changes which have culminated during my year in office be carried forward for their full benefit in strengthening the Institute and in cementing the relations between Branch and Institute. If all members of the Branch wil remain fully conscious of their proprietary interest in the *Journal*, and will contribute freely to its columns, I am confident that this desire will be satisfied.

We entertain no illusion of our ability to please everyone all the time, but since the *Journal* is "for petroleum engineers" we believe that with your help we can please most of the people most of the time. This issue was prepared by the smallest staff to which the term can be applied, and by no means reflects the full scope of our plans. Some of its features are experimental. Others that are intended, such as reviews of current literature, could not be developed for immediate inclusion.

We are open to editorials, and like them provocative. "Letters to the Editor" will be awaited with interest and should make up an interesting department. Observations on current or possible technical practice or concept, not adaptable to full technical paper treatment, will be welcomed and used in a department titled "Technical Notes." All petroleum Local Sections are not represented in this issue, but we believe they will be in the next. We know that both your Section and the *Journal* will profit from your views on the best use of this space. You are a part owner of the *Journal*. Its columns are open for expression of your opinion. Its editorial style, content and proportioning of space are susceptible to your wishes and can be altered in any way that does not conflict with Institute standards or impair coordination with the monthly publications of the other Branches.

L. W. Alcorn

SHELDON AND ANDREWS TO EXECUTIVE GROUP

Dean H. Sheldon, consulting engineer, and Paul Andrews, chief production engineer, Signal Oil & Gas Co., both of Los Angeles, have been appointed to three and one year terms, respectively, on the Petroleum Branch Executive Committee. They will take office on Feb. 15 at San Francisco.

Sheldon, appointed by the Committee to a vacancy caused by the resignation of T. A. Atkinson, is a Texan by birth but a resident of California since 1911. He graduated from Stanford University in 1931 and received a M. Sc. degree from USC in 1932. He was with Union Oil Company of Calif. from 1932 until 1941, the last seven years in various engineering positions. From 1941 until 1945 he was petroleum engineer for R. E. Havenstrite. Sheldon has just completed a year as Chairman of the Pacific Petroleum Chapter.

Andrews, also a Texan by birth, graduated from the University of Utah in 1924 and entered the oil business at Long Beach in 1926 with the Standard Oil Co. of Calif. natural gas division. He was with Italo Petroleum Corp. as production engineer, 1928-30, and with his present company since then. He is chairman of the Wilmington and Huntington Beach Fields Engineering Committees and has held and still holds several important posts with the API and the Conservation Committee of California Oil Producers. He has been active in the AIME for several years and is now Chairman of the Pacific Petroleum Chapter, succeeding Sheldon.

Dean Sheldon

Paul Andrews

Other members of the Executive Committee which will function until February, 1950, are L. E. Elkins, Chairman, Gail Moulton and John Sherborne, Vice-Chairmen, Harold Decker, S. E. Buckley, B. C. Craft, I. W. Alcorn, and John Murrell. The four first named were elected in August, 1948, the others carry over from the present committee.

LLOYD E. ELKINS

Petroleum Branch Chairman for 1949

YOUR new chairman applies basketball drive and tau beta intelligence to the problems of numerous organizations. From this brisk administrator, fraternalist, idealist and tireless worker for engineering and civic betterment we may expect skilled guidance.

THIS man whose turn it is to be dissected in print was born near Golden, Colorado, and grew up on the Wheatridge High School basketball team, then took the short walk to the School of Mines for a professional degree in petroleum engineering in 1934. He was Sigma Phi Epsilon, Tau Beta Pi and Sigma Gamma Epsilon; also in the upper 10 per cent of his class. He was a four year standout on a basketball team that dwelt near the cellar and had a classically expensive zest for physical contact.

Stanolind Oil & Gas Co. took him at graduation, sent him to Wink, Texas and advanced him successively to Petroleum Engineering Supervisor, Assistant Chief Production Engineer, Chief Production Engineer, and in late months, Chief Engineer, headquartering in Tulsa. Another advancement, to top position in the company's research, is in the making. He has just returned from the Harvard Business School advanced management course.

Lloyd's national honors already include the 1947 Vice-Chairmanship of the Petroleum Branch, from which post he handled the Tulsa Fall Meeting in 1947, and the Chairmanship of the API's Mid-Continent Production District. Local honors have been the 1945 Chairmanship of the Mid-Continent Local Section, the current Vice-Presidency of the Tulsa Engineer's Club, and an eldership in the large First Presbyterian Church, as well as several important positions on the Tulsa Council of Churches. He is also a member of the Tulsa Geological Society and a contributor to AIME and API literature. Like the girl in "Oklahoma," his weakness seems to be that he "cain't say no" if the cause is good.

On the personal side the record is equally appealing. His enthusiasm for hard work and willingness to shoulder responsibility have made him a natural leader of engineers. He feels that the petroleum engineer will not have fully met the issue as long as an appreciable amount of oil must be left underground. If a mistake might result from a decision based on thorough examination and logical appraisal of all information available we feel that Lloyd would rather be the first to make that mistake than to be deterred from possible substantial progress by the fear of being wrong. This temerity was shown in another way in the dark days of the African fighting when only he and Montgomery knew that Rommel could not go all the way — but he more than Montgomery, as there is no record that the latter had money on the matter.

Two daughters and a son and nee Virginia Crosby, his high school sweetheart, are the Elkins family. Lloyd's recreation, besides work, is golf and dachshunds and having a good time with people. Your researcher has examined a college yearbook and found the send-off quotation under all senior's pictures hard to fathom except the apt one under a thinner Lloyd, "... my mind to me a kingdom is."

Texas Sections Hold Third Annual University Meeting

Five Local Sections in Texas, in collaboration with the University of Texas AIME Affiliated Student Society and the petroleum engineering faculty of the University, staged an Annual Joint meeting on the campus at Austin on Dec. 16-17. This meeting, whose purpose is to familiarize the engineering students with the AIME mode of operation and to promote acquaintance between members of the Sections, was held at A&M College of Texas in 1947 and at Austin in 1946. The attendance at the recent meeting was 150 students and 108 AIME members and guests from over the state.

The four half-day technical sessions were assembled from papers contributed by the participating Sections and were marked by freer discussion than is general at a larger meeting. A student paper contest pitted William Moseley of A&M — *Marine Drilling Barges* — against C. W. Hancock of the University — *Review of Methods of Connate Water Determination*, with the former emerging a narrow winner and the captor of a $50 cash prize from the Gulf Coast Section and a set of Transactions volumes from the Petroleum Branch. Mr. Hancock was also awarded a set of Transactions volumes. Judges were I. W. Alcorn, the Pure Oil Co., Houston; Ken Sclater, editor, *The Petroleum Engineer*, Dallas, and W. L. Ducker, professor of petroleum engineering at Texas Technological College, Lubbock.

Dr. D. M. Wiggins, president of Texas Technological College, thrilled a banquet attendance of 150 with the principal address, *Individualism versus Security*, which is a theme with a million variations but one rarely handled with such consummate speaking artistry and conviction. The point developed by Wiggins was that insecurity, individual, family and national, has made Americans great workers and great fighters, and that all movements toward assured security must finally exact payment in some form of limitation of freedom or personal dignity. We thought of this, as many of his other listeners must, as we read the other day that the city of Detroit had provided a magnificent low cost housing project, none of the tenants of which would be permitted to own television sets.

Austin Authors

J. W. Smith

G. R. Elliott

Ralph Hock

J. A. Slicker

The technical papers presented were:

Jet Perforating of Oil Well Casing, by Robt. H. McLemore, Well Explosives Co., Fort Worth.

Applications of Surface Plugging Agents in Oil and Gas Wells, by A. A. Townsend, Dowell Incorporated, Tulsa.

Fundamental Hydraulics Involved in the Use of Oil Well Packers, by Jack C Webber, The Atlantic Refining Co., Dallas.

Conserving Reservoir Displacement Fluid While Operating an Experimental Gas Injection Project, by J. A. Slicker, Stanolind Oil & Gas Co., Ft. Worth.

Influence of Oil on Subsurface Corrosion of Well Equipment, by Walter Rogers, Gulf Oil Corp., Houston.

Relation of Nozzle Fluid Velocity to Rate of Penetration with Drag Type Rotary Bits, by Douglas Ragland, Humble Oil & Refining Co., Houston.

The Place of the Engineer in the Drilling Industry, by George P. Livermore, George P. Livermore, Inc., Lubbock.

Current Trends in the Design of Rotary Drilling Equipment, by E. F. Shiels, International Derrick & Equipment Co., Dallas.

Unitization and its Engineering Problems, by Philip C. Dixon, Consulting engineer, Houston.

The Hugoton Gas Field, by Jack Dougherty, DeGolyer and MacNaughton, Dallas.

Oil Recovery Prediction, by George R. Elliott and W. L. Morris, Phillips Petroleum Co., Bartlesville.

A Study of Oil and Gas Conservation in the Cotton Valley Field Gas Condensate Reservoir, by Ralph L. Hock, Cotton Valley Field Operator's Committee, Cotton Valley, La.

Branch or Division, Whichizzit?

Let not the reader be puzzled by reference to the petroleum portion of the AIME as "Branch" in places and "Division" in others, as both terms apply only to the same body we have been accustomed to calling the Division. The Metals and Mining Portions of the Institute have been so complicated by the growth within them of many Divisions that the principal recent analysis of AIME organization (the Johnson Committee) thought that label "Branch" should apply only to the principal elements — Mining, Metals

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The Austin audience hears, left, George P. Livermore, Lubbock drilling contractor, tell what the drilling industry would like in its engineers, and right, Dr. D. M. Wiggins, president of Texas Technological College, explaining the dangers of an easy existence.

JOSEPH B. UMPLEBY

Petroleum Branch to Honor F. Julius Fohs, J. B. Umpleby

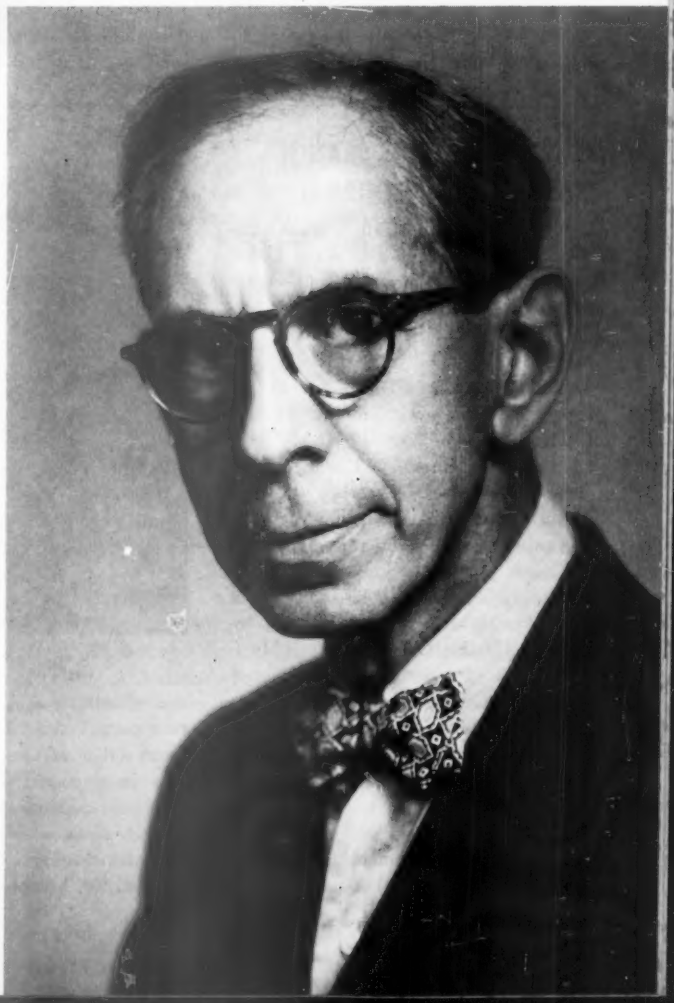
Joseph B. Umpleby, now a Dallas consulting engineer. Graduate of the University of Washington in 1908; Ph.D. University of Chicago, 1910. Geological Survey, State of Washington, and U.S.G.S.; Associate professor of geology, University of California 1915-16. In charge of American Minerals Investigation Committee in Europe at end of World War I. Professor of geology and Director School of Engineering Geology, University of Oklahoma 1919-24.

Organizer of Goldelline Oil Corp. and associated companies operating in Mid-Continent. Formed Petroleum Reclamation Co. in Bradford and was pioneer water flood operator. Sold corporate interests in 1928 and since 1930 has operated as an individual. Carried on oil and mining operations from Seattle 1936-45. World War II assistant administrator of solid fuels, Western U. S. Chairman of the Petroleum Division, 1929; Director of the Institute 1932-35; Chairman of the Division Reorganization Committee 1946; Chairman Lucas Award Committee, 1945.

The citation to read: "In gratitude for his skillful, inspirational and long-continued guidance in the development of the Division, as Division Chairman in 1929, Director of the Institute in 1927-30, and as Chairman or member of many important and effective committees.

1948 recipients of the Certificate of Service were Eugene A. Stephenson, and (posthumously) Earl Oliver and Fred B. Plummer

F. JULIUS FOHS



FURTHER rooting the tradition of formal but warmhearted thank yous to those men whose service in building the branch has been outstandingly unselfish and of extreme value, the fourth and fifth Certificates of Service will be presented at the san francisco dinner to these two professional notables and aime petroleum pioneers.

F. Julius Fohs, now dividing his time between New York and Houston offices and Berkshire summer home. Born in New York City, raised in Kentucky. Studied rocks at twelve and mapped faults and structure at sixteen. Kentucky Geological Survey 1905-12. Consultant in Lexington and Tulsa and coorganizer of the A. E. Humphreys' companies 1912-20. Fohs Oil Company 1932-46. Special lecturer, Kentucky, Columbia and New York Universities 1906-48. Foreign oil studies include Palestine, Sicily, Northern Italy, Germany, Mexico, Canada. One of first to use and appreciate value of gravity and refraction geophysics, and to recognize importance of faulting. He has recognized in advance of development more than 75 oil pools.

In memory of their daughter he and Mrs. Fohs established in 1926 a summer camp for underprivileged girls, from which more than 3,700 New York City girls have benefited.

Chairman of the Petroleum Division in 1925-26 and instrumental in establishing committee activities paralleling those at present; also instrumental in persuading heads of major companies that participation of their engineers in the AIME forum for free interchange of ideas had benefits beyond the prevailing Stygian secrecy.

The citation to read: "in gratitude for his outstanding services as Division Chairman, Institute Vice-President, and in many committee posts, and with particular mention of his successful efforts to secure comprehensive publications.

NOBLE PRIZE TO R. L. HOSS

Robert L. Hoss, petroleum engineer, Humble Oil & Refining Company, Houston, Texas, has been awarded The Alfred Noble Prize for 1948. The Noble Prize is a joint award of the various Founder Societies, given annually to a young member of one of these societies for authorship of an outstanding technical paper. Hoss's paper, *Calculated Effect of Pressure Maintenance on Oil Recovery*, presented before the 1947 AIME Annual Meeting, and later published in the Sept. 1947 *Petroleum Technology*, is the basis of the award. The official presentation of the award will be made at the AIME's Annual Banquet at San Francisco on Feb. 16. The last and only previous Petroleum Branch member to receive this award was Ralph Schilthuis in 1938.

Mr. Hoss received a degree in petroleum engineering in 1942 from the University of Tulsa. He worked for the Phillips Petroleum Co. during his undergraduate summers, and full time after graduation until 1943 when he joined the U. S. Army Air Corps. A veteran of two years in North Africa and the Middle East as an engineering officer, he was honorably discharged in Jan. 1946 with the rank of captain.

Robert L. Hoss

After obtaining his master's degree in petroleum engineering from the University of Texas in Jan. 1947, he was employed by the Kewanee Oil Company until June, 1947.

For two weeks in June, 1948 he served on the Army-Navy Petroleum Board in Washington, D. C. Hoss is a member of the AAPG and API. The Petroleum Branch is justly proud that one of its members is the recipient of such an honor and congratulates Hoss.

J. B. ALFORD JOINS BRANCH STAFF - WILL EDIT *JOURNAL*

Joe B. Alford, of Dallas, joined the Branch staff on Jan. 3 to serve as assistant executive-secretary, and editor of the *Journal of Petroleum Technology*. A native of Seymour, Texas, Alford was graduated in business administration from Texas Technological College in 1939, after which he was affiliated with the Texas Power & Light Co. in Dallas. He enlisted in 1940, was commissioned in 1942, served with the 71st Division Artillery in Europe, and was released in 1946 in rank of major.

Alford attended Leland Stanford University in the 1946-47 term to acquire an M.A. in Journalism. He returned to Dallas to handle the publications work of a national concern, and for the past year has combined public relations with the associate editorship of a Southwestern merchandising association magazine.

Alford was married to Miss George Marie Swarthout of Dallas in 1942. They have a six-month-old daughter. If, as, and as soon as the pressing duties of editing and advertising promotion permit, Alford will engage in the many other affairs of the branch. He may be expected soon as a visitor to the Local Sections. This addition to the Branch staff, with the recent employment of Miss Billie Babb as an associate editor, brings the total to four.

Joe B. Alford

Petroleum Sections Aid Army Reserve

The North Texas and Mid-Continent Sections through Warren J. Jackson, and John P. Hammond, their respective chairmen, have signed affiliation agreements with the Department of the Army to sponsor certain Military Intelligence Reserve Units. The affiliation agreements were signed after the expression of majority opinions by the Executive Committees of the Sections. Major Roy Adams represented the Department of the Army, and Lt. Col. Harry H. Werner represented the Fourth Army in the signing of these agreements. Lt. Col. Jack A. Crichton, Military Intelligence Reserve, and a member of AIME, will command the units in Dallas.

This is a part of the Army's program of establishing reserve units in certain branches of the service which are staffed by personnel whose civilian education, experience, and jobs qualify them for work of a related nature in these Army units. Direct appointment to MI commissions may result for applicants recommended by the Section. The units, once formed by personnel recommendations of the Sections, will be under the offices of the Army Reserve Instructors in Dallas and Tulsa for training. This participation in the Army program brought the following letter to both Jackson and Hammond from Maj. Gen. Bolling.

♦ Gentlemen:

The affiliation agreements entered into by these two Local Sections of American Institute of Mining and Metallurgical Engineers have been received in the Intelligence Division, General Staff, United States Army. It is gratifying to acknowledge the patriotic participation of the American Institute of Mining and Metallurgical Engineers in this very important Organized Reserve Corps training program.

All details pertaining to the organization and training of affiliated units are handled by the appropriate Army Headquarters. In the case of the American Institute of Mining and Metallurgical Engineers units, the Senior Instructor, Organized Reserves, Texas Military District, Fourth Army, will provide every necessary assistance, guidance and liaison. As soon as the personnel to comprise these units are selected, a training program will be

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San Francisco Offers Technical Papers, Development Reports

Hewetson, Moeller, Cadle On Economics: Reese Taylor Dinner Speaker

Since pp 15-20 of Section 2 of this issue are devoted to general information on the coming Annual Meeting in San Francisco, the following information on the Petroleum Branch program will complete the story and enable you to make plans for attendance at what promises to be an unusually enjoyable meeting. The Branch program follows the general pattern established in previous years, except that in anticipation of a greater attendance than for the New York meetings the technical session has been lengthened to a full day; not, however, at any reduction of the economics and production statistics sessions.

Technical papers have been arranged by the Production Technology Committee, R. W. French, Jr., chairman; R. H. Smith, vice-chairman. The economic papers have been arranged by the Economics Committee, R. J. Bradley, chairman; C. L. Rice, Jr., vice-chairman. Carlton Beal is general chairman for the meeting.

At the time of this printing some minor uncertainties were still besetting committees handling the program, so that mention here is not intended to be total assurance that all papers listed will be given, or that others will not be.

Monday, February 14

2:30 p.m. Room of the Dons, Mark Hopkins Hotel
D. V. Carter and Gail Moulton, Presiding
Welcome by I. W. Alcorn

Highlights of worldwide development will be given in a number of fifteen-minute summaries. Foreign reports will be handled by, or at the delegation of, W. H. Farrand, The Texas Co., New York City, and will separate the Far and Middle East, Europe, South America, Canada, and Mexico.

United States summaries will be presented by G. E. Eddy, Michigan Dept. of Conservation (Northeastern U.S.); L. E. Porter, Richfield Oil Corp. (Calif. and Pacific Northwest); R. M. Larsen, U. S. G. S., Casper, Wyo. (Rocky Mountain States); Proxy for E. G. Dahlgren, Oklahoma City (Mid-Continent), and Owen Thornton, The Texas Co., Houston, (Southwestern and Southeastern States.)

These summaries are based on preliminary reports from the eighty-odd authors who will later prepare complete reports for publication in the 1949 volume *Statistics of Oil and Gas Production and Development*. The presentation of this Annual Meeting session and the publication of the volume are functions of the Production Review Committee, which includes W. H. Farrand, G. E. Eddy, Gail Moulton, Alec Crowell, E. P. Hayes, R. M. Larsen, L. E. Porter, E. G. Dahlgren and D. V. Carter, the last two being committee chairman and vice-chairman, respectively.

Tuesday, February 15

Petroleum Economics Session

9:00 a.m. Room of the Dons, Mark Hopkins Hotel
R. J. Bradley and C. L. Rice, Jr., Presiding

The Pacific Coast — Its Growth and Its Petroleum, by Austin Cadle, Mgr., Economics Dept., Standard Oil Co. of Calif., San Francisco, Calif.

The Recent Canadian Development and its Economic Implications, by H. H. Hewetson, President, Imperial Oil Co., Toronto, Canada.

The Natural Gas Industry in Southern California, by William Moeller, Jr., Vice-President, Southern California Natural Gas Co., Los Angeles, Calif.

Tuesday, February 15

Annual Petroleum Branch Dinner

Red Room, Fairmont Hotel
Cocktails, 6:00 p.m. Dinner 6:45 p.m.

Installation of Officers for 1949. Presentation of Petroleum Branch Certificates of Service to F. Julius Fohs and J. B. Umpleby. Principal address, "The Greeks Had a Word for It," by Reese H. Taylor, President, Union Oil Co. of Calif.

Wednesday. February 16

Technical Session

9:00 a.m. Room of the Dons, Mark Hopkins Hotel
Presiding, R. W. French, Jr., and Lloyd E. Elkins

Steady State Flow in Single-Phase Reservoirs, by F. A. Collins and E. R. Brownscombe, the Atlantic Refining Co., Dallas.

A New Compressibility Correlation for Natural Gases and Its Application to Estimates of Gas in Place, by E. B. Elfrink, C. R. Sandberg and Terry A. Pollard, Magnolia Petroleum Co. Field Research Laboratories, Dallas.

Application of the La Place Transformation to Flow Problems in Reservoirs, by A. F. van Everdingen, Shell Oil Co., Houston, and Wm. Hurst, Consulting Engineer, Houston.

Capillary Pressure Measurements on Porous Materials, by John C. Calhoun, Jr., Chairman, Dept. of Petroleum Engineering, Univ. of Okla., Norman; R. C. Newman and M. Lewis, Jr.

Technical Session

2:00 p.m. Room of the Dons, Mark Hopkins Hotel
Presiding, Carlton Beal and John E. Sherborne

The Hugoton Gas Field of Kansas, Oklahoma and Texas, by J. F. Dougherty, DeGolyer & MacNaughton, Dallas.

Introduction to Induction Logging and Application to Logging of Wells Drilled With Oil Base Mud, by H. G. Doll, Director of Research, Schlumberger Well Surveying Corp., Ridgefield, Conn.

Behavior of Binary, Ternary and Multicomponent Systems at States Similar to Those Encountered in Condensate Fields, by B. H. Sage and W. N. Lacey, California Institute of Technology, Pasadena.

Thursday, February 17

Branch Executive Committee Meeting

9:00 a.m. Conquistadore Room, Mark Hopkins Hotel
Open to all members of the Petroleum Branch

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An attempt is being made to have preprints of all technical and economics papers available for the meeting, while few, if any of the production review reports can be preprinted as they are submitted only a few days in advance of the meeting. Preprints *may* be available *after* the meeting on written request to the Dallas office. Requests should include 25c in stamps, but no charge is made because of the probability that any sets mailed will be incomplete. Some consideration is being given by the Executive Committee to distribution of preprints before any meeting to all who pay the registration fee in advance, with credit being allowed those who attend. Such a system, if adopted, could not be applied for several months. Meanwhile, the comment of the membership is invited.

Mid-Continent Section Activities

by H. A. KOCH

Factors to be Considered in the Proper Cementing of Casing, by George C. Howard and J. B. Clark, Stanolind Oil & Gas Co., was given. The paper was presented by P. P. Scott, of the author's company, on December 13.

Scott indicated that increased rates in pumping remove a higher percentage of circulatable mud from the well. It was recommended, as a result of extensive laboratory tests, that in displacing mud with cement, the annular velocities should be in the range of upper laminar to turbulent flow. It was further stated that in no case could mud filter cake be removed due to velocities alone. A conclusion derived from the tests was that the use of mechanical type wire bristle scratchers is the most effective method of removing mud cake now available in pipe cementing operations.

N. A. Tinker, Jr., Weatherford Oil Tool Company, in discussion, stressed that it was highly important that the pipe be in motion at all times during the placement of cement.

The January 10 meeting of the Section will be in Lorton Hall, University of Tulsa. The paper will be *Transportation of Bit Cuttings in a Rotary Drilled Well*, by G. C. McDonald, Gulf Oil Corp.

study group activity

Study Group activities of the Section, highly successful last year, are being continued through 1949. These activities are carried out through a committee headed by John Arps and including C. M. Copeland, John P. Hammond, L. A. Logan, Jim F. Adkisson, Jr., A. E. Smith, A. W. Walker, C. H. Keplinger and A. W. Francis, Jr., and are divided into production and drilling, and reservoir engineering programs. Meetings of the production and drilling groups are on the fourth Tuesday of each month at 7:30 p.m. in the Engineering Bldg. at the Univ. of Tulsa. Reservoir program comes on the third Tuesday, same time and place.

Topics which will probably be covered in coming sessions of the drilling and production group may be roughly entitled as follows: (1) Consolidation of Sands (2) Water Purification for Flooding (3) Application of Temperature Surveys in Completions (4) Squeeze Cementing (5) Increased Drilling Rate by Controlled Weight (6) Diamond Coring (7) Well Head Equipment on Flowing Wells (8) Directional Drilling (9) Radioactive Logging and (10) Casing Design.

H. A. KOCH, the *Journal* Secretary, is a sales engineer with Dowell Incorporated, Tulsa. Native of Clifton, Okla., with B.Sc. in P.E., Univ. of Okla., he has been a singing medalist, Honduras banana boat radio operator, California roughneck, gun perforator operator, field engineer, and golfer.

John Arps

The reservoir engineering programs will be mainly presentations of reservoir performance of various fields. This general intention was carried out on Oct. 19 when R. S. Chapman, Carter Oil Co., discussed Louden Pool, Ill., and on Nov. 30 when W. L. Horner, Barnsdall Oil Co., discussed Midway Pool, Ark. Coming meetings will probably take up the following fields: Elk Basin, Steamboat Butte and Lance Creek, Wyo.; South Burbank, West Edmond, Velma and Hastings, Okla.; Rangely, Colo., and East Texas.

The success of the committee in finding well qualified men to lead discussion on a wide variety of subjects is shown by the fact that the twelve meetings of the two groups prior to this season's activity attracted average attendance of 46 members, guests and students.

Other reservoir engineering group programs to date have been:

Predictions of Water Flood Recoveries from Core Analysis, by R. C. Earlougher, Earlougher Engineering Co., Tulsa.

Interpretation of P-V-T Data and Bottom Hole Sampling, by A. B. Cook, U.S.B.M., Bartlesville.

Producing Mechanisms of Oil and Gas Reservoirs, by Prof. A. W. Walker, Univ. of Tulsa.

Phase Behavior in Condensate Fields, Kenneth Eilerts, U.S.B.M., Bartlesville.

Calculation of Water Influx in Water Drive Fields, by John Arps, British-American Oil Prod. Co., Tulsa.

Flow of Fluids Through Reservoir Rocks, by Prof. John C. Calhoun, Jr., Univ. of Oklahoma.

Drilling and production group programs have been:

Increased Oil Recovery Through Proper Use of Separators and Storage Equipment, Ralph Roe, Sam Wenger and A. W. Francis, Jr.

Causes and Control of Oil Field Corrosion, by Paul Menaul, Stanolind Oil & Gas Co., Tulsa.

Production of Oil by Gas-Lift, by W. M. Gebo.

Current Mud-Treating Problems, by J. B. Kimbrell and A. E. Huebotter.

Cementing Practice, by Willard Hassebroek, Halliburton Oil Cementing Co., Duncan.

Subsurface Operation of Drilling and Fishing Tools, by Raymond Alford and C. M. Hart.

Chemical and Mechanical Treatment of Crude Oil Emulsions, by R. D. May and J. B. Robinson.

Kansas Section Activities

by CARL LUND

Organizational Meet

This Section is the Institute's newest. Its formation was brought about by discussion with Kansas members, commencing in the spring of 1948 and climaxed at an organization meeting on Oct. 20 at the Broadview Hotel, Wichita. At this meeting V. J. Mercier, Lane-Wells Co., Wichita, a leader in the pre-organization activities, was elected chairman. Gene E. Abernathy, consulting engineer of Eureka, and Walter C. Pearson, Stanolind Oil & Gas Co., Ellinwood, were elected vice-chairmen for Eastern and Western Kansas, respectively. W. F. Brown, Dowell Incorporated, Wichita, was elected secretary-treasurer.

Much of the meeting was devoted to discussion of the procedure for organizing and the program of activity. George Peschke, gas engineer of the State Conservation Dept., talked on "The Engineer and the Conservation Department", to point out the part each plays in the formation of practices.

A petition to the AIME Board of Directors for authorization of the Section was presented by Chairman Mercier at the El Paso Regional Meeting. Authority was issued by the Board from its Nov. 17 meeting, so that the Section is now duly constituted to include all of the State except the southeastern corner.

Elected in Kansas

P. T. Amstutz

C. F. Weinaug

P. A. Witherspoon

W. R. Warren

CARL LUND will be the *Journal* Secretary for the Kansas Section. A native of Ponca City, he attended Okla. City Schools and the Univ. of Okla. From 1940 until 1947 he was with Anderson-Prichard Oil Corp., and is now with Moorlane Co., Wichita.

december 17 meeting

The first regular meeting, in the Broadview Hotel, was highlighted by many features. Guests and members were given name plates upon their arrival and introduced by a volunteer reception committee. The festive occasion was accentuated by a Fellowship Hour around a punch bowl provided by the A. Owen Holliday Co. of Wichita. After dinner the prize of the evening was awarded the holder of the lucky number. The prize, a portable radio, was won by Larry Fitch of Rinehart's Oil Reports.

The unanimous election of the following additional officers ensued: D. H. Sholtus, Great Lakes Carbon Corp., Wichita, was elected vice-chairman for Wichita; Chas. F. Weinaug, Univ. of Kansas, Lawrence; Paul A. Witherspoon, Phillips Petroleum Co., Eureka, and P. T. Amstutz, Amstutz and Yates, Inc., Wichita, were elected directors for two-year terms. Waldo R. Warren, Stanolind Oil & Gas Co., Ellinwood, was elected a director for a one-year term.

The election was followed by a proposed resolution to award prizes for technical papers written by members of the Section, and for the best Student Associate paper. The resolution met difficulty in discussion and was tabled until the January meeting. Martin E. True of the Humble Oil and Refining Co., Houston, presented *Semi-Automatic Power Operated Drilling Machinery*. It was announced that the Section would hold a meeting on Jan. 7, 1949, at the Country Club, Eureka, consisting of a fellowship hour, barbecue dinner and technical session featuring William E. Stiles, Core Laboratories, Inc., Dallas, who will give *Use of Permeability Distribution in Water Flood Calculations.*

It was announced that there would be a meeting in Great Bend Feb. 9, 1949, consisting of a fellowship hour, a dinner and technical session featuring George C. Howard, Stanolind Oil and Gas Co., Tulsa, who will present *Features to be Considered in Obtaining Proper Cementing of Casing.*"

Officers of the newly formed Kansas Local Section look on as E. Gail Carpenter, chairman, Kansas Geological Society, presents a gavel to V. J. Mercier, Lane-Wells Co., Wichita, the first Section Chairman. From left: W. F. Brown, Dowell Incorporated, Wichita, secretary-treasurer; Gene E. Abernathy, consulting engineer, Eureka, vice-chairman for Eastern Kansas; E. G. Carpenter, V. J. Mercier, and Walter C. Pearson, Stanolind Oil & Gas Co., Ellinwood, vice-chairman for Western Kansas.

Oklahoma City Section Activities

by HAROLD SELLS

A highlight of future activities in the planning stage consists of a one or two day district conference which will be held in cooperation with the Mid-Continent Section and the Universities of Oklahoma and Tulsa. Tentative plans schedule the first meeting in the spring, with details as to time and place to be announced. A suggestion has been made that annual spring meetings be held alternately between Norman and Tulsa, with the Oklahoma City Section and Oklahoma University sponsoring the meetings at Norman, and the Mid-Continent Section and Tulsa University sponsoring the meetings at Tulsa.

Henry Schaefer, Stanolind Oil and Gas Co., provided comments in connection with the presentation of that most unusual motion picture, *Limestone Pore Space Studies*. The pictures were made by a device which shaved off the face of limestone and sandstone cores after which single frame pictures were made to give the appearance of moving through the core. Molten paraffin containing very fine carbon black, in some instances, and a soluble dye in others, had been squeezed into the pores of the core.

The pictures showed the intermediary porosity of the limestone in which many pores existed having dimensions as large as 0.2 inch. Some cases showed crystal growth within the pores. Pictures taken using the dyed paraffin indicated the intergranular porosity of the sandstone cores removed individual grains rather than cutting through them.

Plans for the future are to make similar tests with paraffin and salt solutions which will set up in the core upon cooling and will permit determination of those parts of the rock which are filled with oil and with water under flowing conditions.

december 16 meeting

The final regular meeting for 1948 was held at the Skirvin Tower Hotel. Professor A. W. Walker of Tulsa University presented a detailed and informative paper on Squeeze Cementing. A lengthy discussion, both in agreement and disagreement with theories presented, followed the paper. As presented by Prof. Walker, a study of the literature and field operations indicates conclusively that squeeze cementing operations are performed almost exclusively as corrective measures in the completing or the working-over of wells. The most common use is to correct for faulty cement operations during original well completions. Careful study of field operations indicate that in most cases formations are broken-down at pressures far less than that required to lift the overburden, and that large quantities of drilling mud and cement may be pumped into the well (and formation) at pressures less than that of the overburden. Analysis of the forces indicate that the formations will be ruptured vertically at pressures which are to a large extent independent of the weight of the overburden, although bearing a rough relation to it. It is logical to believe that most of the cement and mud which is pumped into wells is disposed of in these vertical fissures and as such does little if any good to the productive characteristics of the formations. This leads to the conclusion that the aim of all cement squeeze operations should

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HAROLD SELLS, *Journal* Secretary, is a B.Sc. in P.E. from the Univ. of Kansas, who worked two years with Kerlyn Oil Co., then four as engineering officer of a destroyer escort on Atlantic convoy. After teaching a year at Lawrence he joined Sohio Petroleum Co., Oklahoma City.

Oklahoma A&M Forms Student Chapter

On November 17, 1948, Old Central at Oklahoma A & M College served as the sprouting ground for the newest organization on the campus. That night, 65 interested students assembled for the first meeting of the Petroleum Engineering Club, an Affiliated Society of the AIME.

Oklahoma A & M is a land-grant college, established at Stillwater in 1891, with an initial enrollment of 45 students. Today, Oklahoma A & M boasts an enrollment of over 11,000 students, 2,824 of them being in the Oklahoma Institute of Technology. The department of mechanical - petroleum engineering has an enrollment of approximately 250 students.

W. H. Strang, executive secretary of the Petroleum Branch, AIME, attended the organizational meeting and assisted by explaining the history, aims, and activities of the AIME. Officers, elected to serve the remainder of this academic year, are: O. Lewis Smith, president; Robert J. Brakey, vice-president; James E. Brazell, secretary; John W. Jackson, treasurer. Glen Lee Corrigan, associate professor of mechanical engineering, was elected faculty advisor for this year. Joel E. Yarborough, of the George E. Failing Supply Company, Enid, Oklahoma, has been selected as the club's counselor.

The club will meet the third Thursday of each month. If the interest shown at the first meeting was any indication of the enthusiasm with which the petroleum, geology, and other students will enter into the programs of the AIME, the Petroleum Engineering Club can look forward to a long and successful life at Oklahoma A & M.

O. L. Smith R. J. Brakey J. E. Yarborough J. W. Jackson J. E. Brazell

Gulf Coast Section Activities

by J. E. KASTROP

Almost 100 members and guests gathered at the Houston YMCA for the Nov. 16 meeting. George L. Nye, Chairman, presided. I. W. Alcorn gave a brief report on the El Paso Regional meeting.

W. H. Strang commented on the new publication program. Featured speaker was Walter Rogers, Gulf Oil Corp., Houston, author of the soon-to-be-published book, *Composition and Properties of Oilwell Drilling Fluids.* Holder of a M.S. degree in chemical engineering from the Univ. of Pittsburgh, he has been associated with the Gulf for 22 years, during which his major concern has been corrosion. He is a member of the AIME, ACS and one of the founders of the NACE.

His talk, *Influence of Oil on Subsurface Corrosion of Well Equipment,* contained unpublished information. Corrosion studies on oil wells date to 1924, when the fluid produced in the Goose Creek field caused trouble. These early studies brought about the change from wrought iron pipe to grade C steel pipe.

Factors which affect corrosion were summed up as the following: (1) potential difference existing across the affected area, (2) its electrical resistance (3) pitting factor (4) temperature (5) time (6) fluid velocity (7) pH, which is a function of the fluid acidity (8) hydrogen sulphide concentration (9) protective coating (10) water-to-oil concentration and (11) wetting power of the oil. Only the last two factors were studied in detail.

Shape of a small drop of oil on a cleaned steel surface immersed in a sample of water was carefully investigated. The drop size ratio, or the ratio of the height of the droplet to its radius, was used as an indication of the wetting action of the oil on steel in the presence of water produced with the oil sample under investigation. These studies were extended to the wetting action of some field condensates on steel in the presence of water produced with the condensates. Wetting action of a drop of water in the presence of the condensates was also studied. Results showed that condensates possess little wetting action on steel, while water exhibited considerable wetting action in the presence of condensate.

J. E. KASTROP is the *Journal* Secretary for the Gulf Coast Section. A native of Texas and B.Sc. P.E. graduate of the Univ. of Texas, he was engineer-trainee with Humble Oil & Refining Co., then 3½ years a naval person, released as lieutenant. Since 1946 he has been with Gulf Publishing Co. and is now district editor of *World Oil.*

Investigation showed that where the oil had considerable wetting action, less corrosion resulted. It was also found that the older oils, largely of the heavier types containing naphthenic acid, exhibited the greatest wetting ability. Tests showed that almost no wetting action occurred when oil was placed against a sulphide surface. Studies showed that the greater the amount of oil in the water, the greater the protection afforded the steel. A correlation was made between percent protection and drop size ratio.

Rogers said that Schlumberger Oil Well Surveying Co. developed an instrument to measure the amount of protection existing on the inside wall of tubing in producing wells. The device measures the resistance of the oil film on the tubing wall as an electrode is passed through the tubing. If no resistance was indicated, it was assumed that the tubing wall had no protective film on it. One resistance log made of a pumping well showed that the tubing contained no protective film for short distances at 25-foot intervals; accounted for by the wiping action of the rod joints against the tubing walls.

december 21 meeting

The Section met at the Houston YMCA with 68 present. Owen Thornton reported on the December 16-17 Austin, Texas, meeting of the Texas Sections

A paper, *Factors Used in the Allocation of Production Among Pools and Within Pools,* was given by Edgar Kraus, chief geologist, the Atlantic Refining Co., Dallas. Kraus has served as chairman of the Committee on Allocation of Production and Well Spacing of the API since 1943. He was graduated from Columbia University School of Mines with an E.M. degree. After a short tour in the copper mining business in Arizona, he entered the oil business in 1919 as a consultant and later joined the Pierce Oil Corporation.

Mr. Kraus' paper was a compilation of material by individuals serving on the API Committee of which he is chairman. Many of the factors now in

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During the social hour at the December 21 meeting Edgar Kraus, left, is welcomed by George L. Nye, Section Chairman. Center, Dr. Brian Eby, consulting geologist, Houston; A. B. Stevens, professor of petroleum engineering, A&M College of Texas; I. W. Alcorn, The Pure Oil Co., Houston, and C. A. Russell, independent operator, talk it over, as do J. O. Lewis, Houston consultant, and (right) Ralph W. Wilson, Baroid Sales Div., National Lead Co.

North Texas Section Activities

by KENNETH F. ANDERSON

Research programs were discussed at the Nov. 30 and Dec. 13 meetings of the Section. William Murray, Jr., Chairman of the Texas Railroad Commission, spoke in Dallas to 116 members and visitors on the research program to be conducted between the Railroad Commission, Texas A & M College, and the University of Texas. Terry Pollard, Supervisor of Production Research, Magnolia Research Laboratories, Dallas, gave his ideas on the best methods of conducting production research to 61 members and visitors in Fort Worth.

Murray said that $50,000 is to be allocated to each school by the Railroad Commission, although the exact scope of the work has not been decided. He cited several Arkansas fields whose estimated recovery has been increased 100% or more by pressure maintenance and pointed out that the Texas recovery range of 20 to 40% left much room for improvement.

Murray expressed gratification at the work of industrial laboratories and said the state program would not duplicate their efforts but would supplement them and be particularly helpful to small operators. The talk brought on a live discussion that covered suggestions for the program, unit operation, the economics of conservation and even touched on the Commission's recent shut-down order for several gas-flaring fields.

KENNETH F. ANDERSON, a native of Rolla, Mo., and a B.Sc. P.E. graduate of Missouri School of Mines, is the *Journal* Secretary for the North Texas Section. He is a petroleum engineer with the Bureau of Mines, in Dallas.

december 13 meeting

At Ft. Worth Pollard defined oil production research as the discovery and development by any conceivable means of all economic techniques for increasing the ultimate recovery of hydrocarbons. The need for such research is justified by the increasing demand for oil and the limited known reserves which are presently being depleted by methods resulting in relatively low recovery efficiencies. The realization of the need for extensive research is well shown by the efforts being made by those making up and associated with the oil industry. Most large operators are conducting research on their own and it has been estimated that the cost of this research will be from 15 to 20 million dollars in 1949. He pointed out that in addition to the operating companies engaged in research there are several million dollars spent annually by government agencies, institutions, and service and supply companies.

Pollard sketched his ideas of sound administrative organization of a laboratory and said the trend of production is to cover all problems encountered in both drilling and production. This includes development of new and the improvement of old methods of making holes in the ground, improving drilling fluids, developing better ways for completing wells, and learning more about the flow of reservoir fluids and the factors governing reservoir performance. To gain more knowledge by research it will be necessary to make changes in many of our established trends of thought and procedures. Although some of these changes will have to originate within the petroleum industry, the speaker indicated that many can come by the use of a little imagination and ingenuity applied to research already conducted in the other fields of science and industry.

W. J. Murray, Jr.

T. A. Pollard

Continued on Page 22, Sec. 1

Lt. Col. H. P. Werner accepts from Warren J. Jackson, Lane-Wells Co., Dallas, a contract for the formation by the North Texas Section of Army Military Intelligence reserve units. Lt. Col. J. A. Crichton, MI Reserve, DeGolyer and MacNaughton, Dallas, at right, will supervise the Section's Army program. The Mid-Continent Section signed a similar agreement (story on page 12).

East Texas Section Activities

by ROY BEERY

The Section elected new officers to serve for 1949. Jack M. Shepherd, Humble Oil & Refining Co., was elected chairman to succeed D. W. Akins, Jr. Other officers elected were W. W. Leonard of Shreveport, vice-chairman, and Roy Beery of Kilgore, secretary-treasurer. The new directors elected for a two year term were John Bell of Tyler, Robert M. Hess of Kilgore and W. M. Jones of Greggton.

Following the election, Douglas Ragland, Humble Oil & Refining Co. of Houston, gave a summary of a paper entitled *Results Obtained With High-Nozzle-Fluid-Velocity Rotary Bits,* by J. P. Nolley, George E. Cannon and Douglas Ragland. The paper is a progress report on the field application of a long-range study of drilling technique being carried out as a research project by the author's company. The study compared the rate of penetration for conventional rotary bits with the rate of penetration for a new design of drag-type bit which controls the velocity and the direction of the drilling fluid by tungsten-carbide nozzles. The new jet-type bit design produces nozzle velocities of 200 to 500 feet per second as compared to a velocity of 80 to 200 feet per second for conventional type bits.

The address included numerous color slides illustrating the relationship between nozzle velocity, pump volume, hydraulic horsepower, weight on the bit and drilling rate. Of practical importance to tool pushers and drillers were tabulations that would permit the proper selection of bit-nozzle and pump-liner diameters for drilling deep wells in Texas, Louisiana and Mississippi. In summarizing the results of the study, Ragland stated that the new jet type bits averaged 93 percent faster drilling speed and 45 percent more footage per bit than conventional-type drag and rock bits. Considerable work is yet to be done on similar tests, but conclusion that an increase in nozzle velocity will decrease drilling time seems justified.

Louisiana Polytechnic Adds P. E. Department

Addition of a Department of Petroleum Engineering at Louisiana Polytechnic Institute, Ruston, La., has been announced by Roy T. Sessums, Dean of Engineering of the 52-year-old state college. The new department will be in operation with the term beginning Feb. 1 and will be headed by Glen Lee Corrigan, who is now associate professor of mechanical engineering at Oklahoma A&M College and in charge of the petroleum option there.

The course at Ruston will offer a B. Sc. in Petroleum Engineering for four years study and will emphasize basic science and geology. Corrigan, who brought about the formation of an AIME Student Society in his final months at Oklahoma A&M, will be surveying similar possibilities at Louisiana Polytech.

G. L. Corrigan

gulf coast activity

Continued from Page 19, Sec. 1

current use in oil producing states in this country, he stated, reflect engineering study and recommendation by engineering bodies. In explaining how various allocation factors were used, Kraus said that regulatory bodies usually provide schedules and formulas which reflect the opinion of industry as to equity.

Kraus briefly reviewed the factors used in the allocation of oil in Arkansas. California, he said, was the first state to employ MER as factor for allocation. The basic factor used in Louisiana is depth. Michigan has no allocation methods among pools. In Mississippi, allocation is largely on a basis of MER. Within pools, allocation is based on acreage. Allocation in New Mexico is automatic, once the production schedule is set for a pool. Initial allocation is based essentially on productivity. Allocation of production in Oklahoma is largely based on market demand and waste. Texas allocation for new pools is based primarily on depth and MER, with the latter factor having the greatest weight. Allocation within pools utilizes the MER to a large extent. In the Rocky Mountain States allocation of production is voluntary on the part of producers.

Walter Rogers

In the discussion that followed Mr. Kraus' paper, it was agreed by several members that costs and economics should be included in the factors which are used in the allocation of production. The meeting was adjourned with the announcement of the Jan. 18 meeting.

sections aid army

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The progress of the American Institute of Mining and Metallurgical Engineers units will be followed here with keen interest. You may be assured that the Department of the Army and all other military agencies having a part in the affiliation program will render every assistance possible.

Sincerely yours,
(Signed) A. R. BOLLING
Major General, GSC
Deputy Director of Intelligence
Department of the Army.

SAN FRANCISCO SPEAKER

REESE H. TAYLOR WAS born in Los Angeles in 1900. He attended Cornell University, and was graduated from the University of California at Berkeley. Upon graduation he went to work for the Llewellyn Iron Works where he remained until 1938, becoming president in 1933 of the successor corporation — Consolidated Steel. In 1938 he became president of Union Oil Company of California. He is a director of the Federal Reserve Bank of San Francisco, Western Oil & Gas Association, American Petroleum Institute, a trustee of the California Institute of Technology, and a member of the AIME and ASME.

okla. city activities

Continued from Page 18, Sec. 1

be to obtain an adequate shut-off, as indicated by proper build-up pressures, with a minimum displacement pressure and amount of cement.

A nominating committee was appointed at this meeting to suggest nominees for Section offices for 1949. Members of the committee are David L. Dooley, E. G. Dahlgren, R. L. Burns, Michael J. Popovich, C. E. Clason and J. C. Calhoun, Jr.

Oklahoma City Personals

Frank Willibrand, assistant vice president in charge of production operations for Sohio Production Co., and **Weston Payne**, vice president in charge of production for Anderson-Prichard Oil Corp., returned from a deer hunting trip in the Gila Monument Area near Silver City, New Mexico, during which they bagged several deer. Payne bagged a 10-point, blacktail 225-pound buck.

Raymond Gahan has joined Anderson Prichard as District Engineer for Kansas and is living at Great Bend. He formerly was with Consolidated Gas Utilities at Oklahoma City. **Ty Dahlgren**, formerly with the Oklahoma Corporation Commission, has established a petroleum engineering consulting office in Oklahoma City. **John T. Cook**,, petroleum engineer, has transferred from the West Edmond Unit to Sohio Petroleum Co. in Oklahoma City. **R. A. Auckerman**, Shell Oil Co. has been transferred from Oklahoma City to McPherson, Kans., as district engineer. **William R. Goodier** of Shell Oil Co. has been transferred from Oklahoma City to Great Bend, Kans., as field engineer. **J. Lawrence Muir**, formerly geologist for Amerada Petroleum Co. in Chickasha, Okla., is now chief geologist for Champlin Refining Co. at Enid.

Outgoing City Officers

R. J. Beams

P. Montgomery

R. H. Burns

M. Hegglund

branch or division

Continued from Page 12, Sec. 1

and Petroleum — so the other title could be retained by their constituent groups, and thus avoid too much change in nomenclature and lend more symmetry to the organizational chart.

Since the Petroleum Branch, at this stage of development, contains only the Petroleum Division, the change breaks continuity of understanding and makes awkward the handling of printed material prepared for the future. Faced with a choice of (1) cheerfully conforming (2) asking that Metals and Mining retain the Division title, to our convenience and their confusion, or (3) sticking doggedly to a label that would par us with the sub-groups of the other two major classifications, we have chosen the first course. The change has been included in the by-laws, so that any subsequent reference to the Petroleum Division is either an accident or in respect to historical accuracy.

EMPLOYMENT NOTICES

The Journal will post notices of men and jobs available. Companies and AIME members are invited to use this space, for which there is no charge. Response to notices which have only letters in the box code should be addressed to the editor in Dallas and will be forwarded unopened to the author of the notice. Response to notices which have both letter and numbers in the box code should be addressed to Engineering Societies Personnel Service, Inc., 8 West 40th St., New York 18. In applying for a position advertised for the ESPS, which is a nonprofit organization under joint management of the Founder Societies, the applicant agrees, if placed, to pay a fee in accordance with standard rates. No fee is involved for placement resulting from notices other than those of the ESPS. No additional information regarding any notice should be expected of the editor.

♦ Petroleum or chemical engineer—doctor's or master's degree, research experience, for petroleum production research program, quarter time graduate teaching. Salary comparable with industry. Location, Texas, Box AA.

♦ (a) Division petroleum engineer with a degree in engineering and ten years' experience in applied engineering, oil field experience, executive engineering in administrative work with preference of some experience in Latin American operations. Working knowledge of Spanish desirable. Should be capable of handling all petroleum engineering problems especially relating to drilling, production and equipment. Salary, $8,400 a year. Location, Venezuela. (b) petroleum equipment engineer, with degree in engineering. Practical oil field experience with oil company and equipment manufacturer desired. Working knowledge of Spanish. Should be capable of selecting, evaluating and checking operation problems and performance of equip-

ment used in drilling oil wells and production. Salary, $5,200-$8,400 a year. (c) field petroleum engineers, single preferred, with minimum of two years' experience in applied field petroleum engineering and oil field experience, with preference of some experience in Latin American operations. Degree in engineering required. Knowledge of Spanish desired. Work will include daily production reports and recommendations on production control. Design installations and make cost estimates on plants, pipe lines, water systems, etc. Salary, $4,800-$5,200 a year. Location, Venezuela and Colombia. Box Y1277.

♦ Petroleum engineer, about 35, with considerable experience in reservoir engineering. Some traveling. Position permanent. Location, New York, N. Y. Box Y1295.

♦ The office of the Director of Naval Petroleum Reserves has a vacancy for a well qualified young Petroleum Engineer, grade P-5, with salary at $6,235.20 per annum. The incumbent of this position will be the authority on all domestic improvements in the field of petroleum engineering, including technical methods of operations and developments in refining processes. He will provide technical data for the Secretary of the Navy, members of Congress, etc., concerning Naval Petroleum Reserves in California, Wyoming, and Alaska and Naval Oil Shale Reserves in Colorado and Utah. He will make periodic field inspections investigating operations to obtain first hand information concerning these matters, and will gather and keep current statistics on these operations.

Minimum qualification requirements for this position include a degree in petroleum engineering or equivalent education or experiences, plus at least four years of progressively responsible professional petroleum engineering experience. The applicant should have a reasonable amount of field experience including geology, geophysics and some technical knowledge of petroleum development and production practices including petroleum refining methods. Persons interested in applying for this position should submit a completed Application for Federal Employment, U. S. Civil Service Commission Standard Form 57, to EXOS: AO Code 612, Room 1213, Main Navy Bldg., 18th and Constitution Ave., N. W., Washington 25, D. C. Application forms may be secured at any first or secnd class postoffice.

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PRIVATE FINANCING OF OIL PRODUCING PROPERTIES

C. L. RICE, JR., ASSOCIATE MEMBER, AIME, EMPIRE TRUST COMPANY, NEW YORK CITY

ABSTRACT

This paper discusses methods of appraising loan value of producing oil properties and the problems attendant thereto; the mechanics of establishing the loan value and the fair trading value of oil producing properties; the instruments which are customarily used to protect the value of oil collateral until satisfaction of the lender's claims; and the relative merits of oil producing properties as collateral for oil loans. Problems and considerations of equity finance are discussed.

INTRODUCTION

The oil industry now represents over twenty billion dollars of capital invested in the men, equipment and "know how" to find, develop, produce, transport, refine and distribute daily, the six million barrels of petroleum products which our present economy demands each day. The welfare of all segments of the oil industry and the vigor with which it meets and solves the inherent problems of oil supply should be the concern of the entire nation and its people.

The capital which has flowed into the industry during the past ninety years has come from three main sources; (1) the annual difference, if any, retained by the industry between the total cost of production and the price received; (2) the venture or equity capital invested in the industry by millions of individuals, either directly or through corporate organizations; and (3) the interest-bearing capital which the industry has borrowed.

It is the latter two sources of capital with which this paper is concerned.

Manuscript received at office of the Division October 1, 1948. Paper presented at the Division Fall Meeting, Dallas, Texas, Oct. 4-6, 1948.

During the past fifteen years, dating roughly from East Texas proration, tremendous strides have been made in awakening and educating the lending institutions of the country to the needs, problems and stability of our domestic oil industry. It is hoped that this paper may facilitate that growing understanding and add to the store of available knowledge on matters of oil finance. I will confine my discussion of borrowed capital to that which is available for loans by commercial banks on the oil producing properties of the smaller independent corporations and of individuals.

Commercial banks are only one of a group of institutions which attempt to meet the financial needs of the oil industry. Other lenders, including other banking institutions and insurance companies are loaning hundreds of millions of dollars annually to the industry. During the last five years certain insurance companies who are substantial holders of major oil company debts have shown an increasing interest in oil production loans to the small oil companies. I exclude discussion of their work except as it applies to the performance of the banking function. I will also exclude consideration of the financing of the major integrated oil companies. We know that their needs for capital are enormous, their security of top quality and their debt servicing capacity well established. In passing, however, it is interesting to point out that the *1947 Financial Analysis of the Chase National Bank* shows that during 1947, thirty of the largest oil companies borrowed a total of $476,000,000 and of this amount $301,000,000 or 63% was borrowed from banks.

Finally excluded from consideration are the many aspects of public financing, either in the form of debt or venture securities, which constitute an important, but highly specialized form of oil finance.

Private financing usually involves two types of capital; interest-bearing, borrowed capital, and equity or venture capital.

Oil borrowers may be classed in two general groups. The first of these groups is comprised of the owners of producing properties who borrow against the value of their properties. The second group is comprised of prospective purchasers of producing properties who borrow against the properties to finance their acquisition.

Normally the reason for borrowing and contemplated use of the proceeds are incidental to the consideration of the loan value of an oil property. The banker's conception of oil exploration and development as rank speculation is too deeply engrained to allow consideration of any values except those which are clearly "in hand" or to schedule his repayment from any assets and earnings except those which are dedicated as collateral to the loan.

GENERAL CONSIDERATIONS

There are four major considerations in any oil production loan. These are:

Security of Principal
Method and Length of Payout
Ability and Character of Borrower
Interest Rates

Security of Principal

In viewing oil loan collateral the banker invariably considers first and foremost "Can we get our money back from the production or liquidation of this collateral?" Bankers, as lenders, can not afford nor are they permitted to put their principal "at speculative risk". Commercial bankers are in effect lending capital which they have

themselves borrowed from depositors. Bankers must handle these entrusted funds with appropriate care, and construct the instruments by which these funds are lent in the manner which in their opinion best assures repayment.

This attitude of trust, so basic and understandable to the banker, is often the most illogical to some oil operators and brokers who seek the banker's assistance in the acquisition of what they believe to be attractively priced oil properties.

Method and Length of Payout

The second major consideration of the banker in analyzing a loan situation is the method and rate of repayment of the loan under foreseeable circumstances. Spending ten years attempting to salvage the principal amount of a hastily analyzed two-year bank loan is neither good banking nor good business, and is certainly the cause of poor banking relations in the future. In this regard the banker must study the overall prospects for the industry, the indicated rate of production and earning power for the individual property over the next ten year period, and examine in detail the potential flow of cash to be available for repayment of a loan over the anticipated payout period. He will attempt to establish a rate of payout which seems to him to be the maximum that the property conservatively can support and still meet operating costs, taxes and capital expenditures.

The methods for arranging repayment of an oil loan are widely varied. One common practice calls for the assignment of a fixed percentage of the gross or net value of crude oil and natural gas produced. The borrower and lender discuss the estimated future cost of operating the property, the estimated additional capital requirements, and the probable income taxes in detail, finally establishing a percentage of gross income required to cover these expenses. The balance then becomes the amount estimated to be available for debt service. This amount may range from 50% to 80% of total proceeds from runs and is assignable in whole or in part to the service of the loan. A percentage assignment is most suitable for loans against a single lease or a small number of leases. It protects the bank's payout in the event of an increased rate of production of their collateral and allows the bank to participate in an accelerated payout if oil prices rise. It protects the borrower against default in the event of reduction in allowables or prices or other circumstances beyond his control. The banker may consider, in such situations, that reduced allowables or price declines are normal business risks for which the bank provides in calculating the amount of the loan, the rate of payout and the interest.

The second method of repayment calls for a fixed amount per month. This method is often combined with the first to schedule repayment at the rate of "$X per month or Y% of the gross runs, whichever is greater".

Normally the fixed amount per month method of repayment is employed with large individual operators or companies who have sources of income or collateral outside of that directly pledged to the repayment of the loan.

The length of payout of a loan is dictated by the estimated cash flow to result from the production of the collateral and the internal loan policy of the bank. Generally these loan policies favor a three to five year maximum payout, depending upon the condition of the money market and the general economic outlook, although oil loans with estimated payouts up to seven years are not uncommon during favorable periods.

Ability and Character of Borrower

The third consideration in an oil production loan, is the ability and character of the prospective borrower. With an individual or the managing group of a small company, banks are naturally interested in having experienced, thoroughly competent oil people in charge of their collateral. The banker looks for the "practical oil man" who knows the oil business, who has a stake in the success of his property, and who can be counted upon to consistently give his best efforts to the operation of the property.

Interest Rates

The interest which a borrower is charged for money secured by suitable and carefully examined collateral, should reflect the going costs of money in his banking area plus a sufficient amount to compensate the lending organization for the work involved in setting up and handling the loan.

A banking institution may buy for its own account high grade marketable bonds such as Shell Union 2½% debentures, Standard Oil (N. J.) 2⅜% debentures, or Standard Oil of California 2¾% debentures, at a price which yields 2¾% to 3% and which may be resold whenever the internal policy of the bank so dictates.

In an oil loan, however, the bank rarely considers resale of the borrower's obligation and is, therefore, committed to its loan for the entire payout period. For this reason a higher interest rate is required on a direct oil production loan than on marketable debt. Additionally, a bank considers the probable mechanical costs of handling a particular loan. For example, on a small loan secured by the production from numerous widely scattered interests of varied nature, the bank may increase the interest rate sharply to cover the cost of bookkeeping, or refuse the loan entirely as unprofitable.

Interest rates in many cases reflect the total worth of a prospective borrower to the bank. A borrower who consistently maintains a sizeable bank balance may receive more favorable consideration on interest to be charged than the prospective borrower who is offering only his loan business, since the former is, in effect, borrowing back a portion of his own money through the medium of the bank.

The most important factor in establishing an interest rate probably is the length of payout of the loan.A banker can normally estimate the trend of interest rates within his area for the next year or two. Beyond that the bank must anticipate the changing trend of money costs throughout the country and, being human, they believe that they too will be getting more for their services in time. In addition a long term loan increases the risks of adverse changes in economic conditions.

THE MECHANICS OF OIL LOANS

What are the mechanics of setting up an oil loan? Several key factors usually are given important consideration in any oil loan. These are:

(1) The net oil and gas reserves to a reasonable economic limit

(2) The indicated net production of oil and gas over the next ten year period

(3) The estimated direct operating costs over the life of the property and over the next ten years

(4) The probable additional capital expenditures over the life of the property and over the next ten years.

The determination of net recoverable oil and gas reserves is the usual start-

TABLE 1

Hypothetical Calculations of Future Net Revenues, Before Taxes, Over Ten Year Period

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	Total
Annual Production, Net:											
Oil BBl.	155,000	155,000	155,000	155,000	150,000	150,000	145,000	135,000	130,000	120,000	1,450,000
Plant Products BBl.	—	16,000	36,000	36,000	36,000	36,000	36,000	32,000	28,000	16,000	272,000
Natural Gas MCF	10,000	15,000	20,000	40,000	40,000	200,000	500,000	500,000	500,000	500,000	2,325,000
Gross Revenues:											
Oil ($2.80)	$434,000	$434,000	$434,000	$434,000	$420,000	$420,000	$406,000	$378,000	$364,000	$336,000	$4,060,000
Plant Products ($3.00)	—	48,000	108,000	108,000	108,000	108,000	108,000	96,000	84,000	48,000	816,000
Natural Gas ($0.04) to 1952	400	600	800								
Natural Gas ($0.06) to 1958 (Contract)				2,400	2,400	12,000	30,000	30,000	30,000	30,000	138,600
Total Gross Revenues	$434,400	$482,600	$542,800	$544,400	$530,400	$540,000	$544,000	$504,000	$478,000	$414,000	$5,014,600
Operating Costs, incl. Lifting Costs, Prod. Taxes	37,500	42,800	54,700	50,000	62,000	65,000	68,000	74,000	79,000	82,000	615,000
Operating Income	$396,900	$439,800	$488,100	$494,400	$468,400	$475,000	$476,000	$430,000	$399,000	$332,000	$4,399,600
Capital Costs (Additional)	65,000	30,000	10,000	5,000	20,000	20,000	20,000	25,000	25,000	25,000	245,000
Future Net Revenues	$331,900	$409,800	$478,100	$489,400	$448,400	$455,000	$456,000	$405,000	$374,000	$307,000	$4,154,600

ing point in setting up the loan value of an oil property.

Some banks have a sufficient oil loan volume to warrant maintaining their own staffs of geologists and reservoir engineers. These experts determine through their own research and appraisal efforts the probable net reserves of a given property. Other lending institutions rely upon the opinion of independent experts for estimation of reserves and evaluation of future net revenues. From our experience we have found that while many engineers and geologists write appraisal reports, only a few produce reserve estimates which can be regarded as sound for computing loan values. For the work of the experts I have nothing but praise. Although they are criticized, sometimes bitterly, for their determination to "paint things as they see them" and, therefore, fail to give credit to such plus factors as the lower horizons which might be productive, the marginal leases which might be economically productive, the sands "behind the pipe" which could be productive, provided, of course, they aren't exhausted when the time comes to recomplete — still in all they generally give credit to every proven and commercially productive barrel in reserve, which is as fair to the borrower as to the lender.

The work of this group of competent, experienced, and truly independent appraisal engineers has been of great benefit to the industry. Lending institutions, who because of their trust obligations toward loan funds, would not, a few years ago, consider term loans against oil in the ground, are now willing, even eager, for such loans if the borrower can supply a satisfactory estimate of reserves and production which permits reasonably accurate determination of loan value and payout. As a result of this change in attitude, hundreds of millions of dollars in the form of borrowed capital have flowed into the industry, and most particularly into the hands of individuals and small independent companies.

Assuming that competent experts have established a net reserve figure down to a reasonable economic limit, an estimate must be made of the future operating costs. These costs could, of course, vary widely over any given field, as a result of relative water encroachment problems, mechanical lifting problems, abnormal fee and overriding royalties, carried interests, oil payments, and other working interest obligations.

Next to be considered are the probable capital requirements for the future operation of the lease. These may include, for example, pro rata costs for the construction of natural gasoline plants, water or gas injection programs, redrilling operations, and installation of pumping equipment, to name a few frequently encountered examples.

At this point let us set up a hypothetical oil loan situation to illustrate the mathematical calculations which are involved in arriving at the loan value of a given property.

Our hypothetical property is, naturally, an excellent holding. It represents 8/8 of the 7/8 working interest in eight oil wells, and four gas and gas-condensate wells located in an oil field which was discovered in 1944. A natural gasoline and cycling plant is under construction to permit sound development of a gas and gas-condensate reservoir.

A report by experienced analysts shows data summarized as follows:

Net Proved and Developed Reserves	Recoverable to Economic Limit	To be Recovered During Next Ten Years
Crude Oil, bbl.	1,900,000	1,450,000
Plant Products, bbl.	350,000	272,000
Natural Gas, MCF	4,200,000	2,325,000
Future Net Revenues, After Taxes	$3,937,500	$3,037,600

The computation of the future net revenues to be derived over the next ten years from the production of these reserves is shown in Table 1.

Examining this table we find that over a ten year period this hypothetical property, using current prices throughout, will produce gross revenues of $5,014,600, have probable direct operating costs of $615,000 and additional capital expenditures of $245,000, leaving future net revenues before taxes of $4,154,600. Normally the banker and not the engineer will calculate the probable income tax liability and deduct that liability from the cash available for debt service. Income taxes, which usually constitute a sizeable liability against net operating revenues, vary widely between individuals and between companies. An income tax advantage such as that available to cooperatives and other organizations enjoying income tax exemption has obviously been most helpful to these groups in acquiring oil properties in recent years.

On Table 2 provision is made for Federal and State income tax liabilities on the basis of an overall 40% tax rate on the net taxable income. Subtracting this figure from future net revenues before taxes, we arrive at the amount of money per year which it is estimated this property can produce for debt service, which amounts in this instance, to $3,037,500 in the ten year projection period.

At this point the internal policy of the bank becomes the predominate consideration. The amount of discount which should be applied to the future net revenue figure to reach the loan value of the property is usually determined by the opinion of the particular banker on the future trend of crude oil prices, the availability of loan dollars, and the current size of the oil loan portfolio.

TABLE 2

Hypothetical Calculations of Estimated Future Net Revenues, After Taxes, Available for Debt Service Over Ten Year Period

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	Total
Future Net Revenues	$331,900	$409,800	$478,100	$489,400	$448,400	$455,000	$456,000	$405,000	$374,000	$307,000	$4,154,600
Estimated Taxable Income[1]	267,900	292,000	319,000	314,000	297,000	302,000	302,000	265,000	242,000	193,000	2,793,900
Estimated Income Taxes[2]	107,000	117,000	128,000	125,000	118,000	121,000	121,000	106,000	97,000	77,000	1,117,000
Future Net Revenues, after Taxes	224,900	292,800	350,100	364,400	330,400	334,000	335,000	299,000	277,000	230,000	3,037,600
% of Gross Revenues	52%	61%	64%	67%	62%	62%	61%	60%	59%	55%	61%

[1]After deducting depletion (statutory rate) and depreciation of equipment.

[2]Federal and State, if applicable, at the rate of 40% of estimated taxable income.

In any case the banker will not loan in excess of (a) the indicated "quick sale" value of the property or (b) the amount which the borrower, if a prospective purchaser, has agreed to pay for the properties.

In the first instance the lender must be prepared to liquidate the property in the event the borrower voluntarily or through forces beyond his control defaults on his obligation. In the second instance the lender must make certain that the borrower has tangible financial reasons for retaining an interest in the acquired property, despite unfavorable developments. If a borrower has no such financial interest, he may well turn his back on the property when times are difficult and seek new properties to be purchased at a lower price with more attractive potential equity profits.

Let us assume, then, that the bank expresses a willingness to lend $1,500,000 at 5% interest, payable out of 50% of monthly gross runs in 1949 and 60% of monthly gross runs thereafter. The banker will probably have made a "spread sheet" something like that shown in Table 3, demonstrating that at the end of the six year period the banker visualizes the loan totally repaid with interest and the simultaneous creation of a contingency surplus fund of $260,300 to cover emergency expenditures which might arise during the course of the loan. At the end of six years there would remain in visible future net revenues, as a "cushion", an additional $2,040,900, to protect the loan against price declines.

When a bank or group of banks have entered into a sizeable long term oil production loan, a yearly review of the operations of the properties is usually required. In this review the effects of changes in price, rates of production, operating methods and other factors can be evaluated and the net effects reduced to future net revenues and visible profits. These reviews, while adding some expense to the cost of borrowing, almost invariably prove to be of real and practical value to the borrower, as well as the lenders.

Another indication of the fair trading value of the property would be the range of visible equity profit. This could be calculated as follows:

TABLE 3

Hypothetical Calculations of Payout of Loan, Including Principal and Interest

	1949	1950	1951	1952	1953	1954
Net Revenue After All Taxes	$ 224,900	$ 292,800	$ 350,100	$ 364,400	$ 330,400	$ 334,000
Assigned Portion of Gross Revenues	217,200	289,600	325,680	326,640	318,240	324,000
Estimated Interest Payable	70,000	62,000	49,000	35,000	20,500	6,000
Balance Available for Repayment	147,200	227,600	276,680	291,640	297,740	318,000
Amount of Loan Outstanding at Year's End	1,352,800	1,125,200	848,520	556,880	259,140	0
Interest Paid (Cumulative)	70,000	132,000	181,000	216,000	236,500	242,500
Principal Repaid (Cumulative)	147,200	374,800	651,480	943,120	1,240,860	1,500,000
Estimated Operating Surplus	7,700	3,200	24,420	37,760	12,160	68,860
Tax Savings on Interest Payable	28,000	24,000	19,600	14,000	8,200	2,400
Indicated Working Capital Surplus	35,700	27,200	44,020	51,760	20,360	71,260
Indicated Working Capital Surplus (Cumulative)	35,700	62,900	106,920	158,680	179,040	250,300

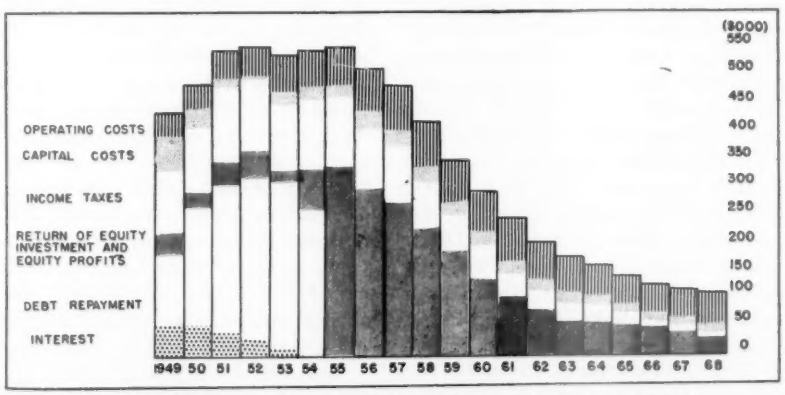
TABLE 4

Summary of Results of Operations Under Hypothetical Loan

	Net Reserves			Future Net Revenues after All Taxes
	Oil (bbl.)	Plant Products (bbl.)	Gas (MCF)	
Original Estimates	1,900,000	350,000	4,200,000	$3,937,500
Produced During Debt Period	920,000	160,000	325,000	1,896,600
Estimated to Remain	980,000	190,000	3,875,000	2,040,900

Total Future Net Revenue, After Taxes	$3,937,500
Repayment of Debt, Interest and Financing Costs (Est)	1,767,500
Future Net Revenues Available to Equity	2,170,000
Less Return of Equity Investment	850,000
Net Visible Profit, after Taxes	1,320,000
Visible Profit as % of Investment	155%
Average % Per Year (20 year period)	7.75%

In consideration of oil properties in general, buyers of equity interests are usually attracted to those situations which can be obtained at between 8% and 10% discount of future net revenues after taxes or with a visible net profit 1½ to 2 times their required equity investment.



20 YEAR PROJECTION OF ALLOCATION OF REVENUE FROM HYPOTHETICAL OIL PRODUCING PROPERTY.

Those lenders who are sincerely interested, and genuinely experienced in matters of private oil finance stand ready to offer counsel and guidance to all who seek it. Often they are called upon to advise with both sellers and buyers as well as supplying loan capital. They must, in their own interests, maintain a good working knowledge on the loan and private equity markets. On their behalf, I urge the full and complete use of their services in handling oil finance problems.

There are nearly as many ways of financing an equity interest purchase as there are oil properties. Each oil producing situation is but a composite of many technical and economic factors. Each seller has a personalized idea of the value of what he is offering, the method by which he should be paid and the disposition of his proceeds. Each buyer of any oil property has his own concept of value, his own net worth and his individual reasons for buying. He has his own tax problem and his own ideas about how and where to finance.

It should now be apparent that the sound financing of producing oil properties is based upon a knowledge of facts; the facts pertaining to the properties, to the sellers, to the lenders and to the buyers. Without these facts nothing can be accomplished. With these facts at hand, properly assembled and interpreted, the problems of sound oil finance can be clearly met and can be dealt with in the best interests and to the mutual benefit of all concerned.

APPENDIX A

Relative Suitability of Oil Properties as Loan Collateral

OIL COLLATERAL	GENERAL RATING AS SOLE COLLATERAL	REPAYMENT CALCULATED UPON AND DETERMINED BY:	INSTRUMENTS OF BORROWING	REPAYMENT TERM*
Proved Leaseholds, Producing	Excellent	Projected Monthly Net Revenues	Deed of Trust or Chattel Mortgage, Assignment of Runs, Term Loan Agreement	3 to 7 Years
Proved Leaseholds, Non-Prod.	Fair, depending on drilling commitments and capabilities	Value Obtainable Through Liquidation	Deed of Trust or Chattel Mortgage, Demand Note, Assignment of Runs	On demand
Unproved Leaseholds	Unsuitable	—	—	—
Proved Royalty, Producing	Excellent	Projected Monthly Income	Deed of Trust, Assignment of Runs, Term Loan Agreement	3 to 7 years
Proved Royalty, Non-Prod.	Fair	Value Obtainable Through Liquidation	Deed of Trust, Demand Note, Assignment of Runs	On demand
Proved Overriding Royalty, Prod.	Good	Value Obtainable Through Liquidation	Deed of Trust, Assignment of Runs, Term Loan Agreement	2 to 5 years
Proved Overriding Royalty, Non-Prod.	Poor, depending on lease commitments	Value Obtainable Through Liquidation	Deed of Trust, Demand Note	On demand
Unproved Royalty	Unsuitable	—	—	—
Unproved Overriding Royalty	Unsuitable	—	—	—
Unproved Fee Minerals	Fair, if located in good oil provinces	Estimated Annual Lease Rentals	Deed of Trust, Demand Note	On demand
Oil Payments	Good, depending upon character and responsibility of operator	Projected Monthly Income	Deed of Trust, Assignment of Payments, Term Loan Agreement	2 to 5 years

*Depends entirely upon the nature and quality of collateral and internal policy of the lender.

DISCUSSION

By K. E. Hill, Chase National Bank, New York City

Mr. Rice is to be complimented on his efforts to present the point of view of a bank with regard to the private financing of oil producing properties. At the same time, I feel that attention should be called to certain features of his article with which I am not in entire agreement. The article is limited to secured loans, although this fact is not clearly stated.

With regard to interest rates, it is our opinion that, in addition to the factors mentioned, the rate charged should properly reflect the degree of risk and should be increased as the *average life* of the loan increases. Obviously, these factors are also reflected in the yield of marketable obligations. It may be noted that the *average life* of a loan with periodic principal installments, as distinguished from the *term* of the loan, may be computed by dividing the total of the unpaid principal at each payment date by the total initial principal. As examples of the significance of *average life*, it may be pointed out that for a five-year loan with equal annual principal payments, the average life is three years; for a five-year loan payable 35, 25, 20, 15, 5 per cent at the end of each respective year, the average life is 2.3 years whereas if payments are made in the reverse order, the average life is 3.7 years. Yet all three are "five-year loans".

With regard to a loan on a specific property, we generally find that the net cash income available for debt service during the term the bank is willing to consider limits the size of the loan more than the questions of policy mentioned in Mr. Rice's discussion of Table 2. Such limitations of available income apply especially to loans on properties operated under proration. In particular the use of the phrase "loan value" is misleading, since what Mr. Rice means is the amount a bank will loan on the property.

Mr. Rice states that the price at which a property is sold is the maximum amount which a bank should lend. This may be true, in unusual circumstances, but Mr. Rice should go further and indicate that a bank, in general, is apt to lend substantially less than the purchase price. To lend full purchase price would, in effect, relieve the borrower of any capital contribution. The borrower should have a reasonable equity interest subordinate to the bank's position, as the lender would otherwise be furnishing all the "risk capital" with only a fixed low rate of interest return.

☆ ☆ ☆

MIDDLE EASTERN OIL AND ITS IMPORTANCE TO THE WORLD

JOHN R. SUMAN, MEMBER AIME, DIRECTOR, STANDARD OIL COMPANY (NEW JERSEY)

Ages ago the Middle East was one of the greatest parts of the world. It had great cities. It saw the origin of great religious movements. It had the greatest civilization. Also, it fought the greatest wars.

The last distinction, however, seems of doubtful merit. If the region had been less great in the wars it waged, it might not have become one of the most depressed areas on the globe, and might not have remained so for centuries.

But because of its oil, the Middle East once more is one of the most important parts of the world. The present program for European recovery makes it the key to avoidance of another early war. I don't know of anything that could be much more important than that.

In order to get a fair idea of the tremendous scope of this economic power which the area possesses in the form of its reserves of oil, one should examine some of the main details on their control and production. I would like to talk about those first; then about the probable trend of the next 15 or 20 years, and later about some of the social and economic aspects of oil developments in the Middle East.

MIDDLE EASTERN RESERVES

One suggestion as to the importance of the area's oil is contained in figures on the principal proven reserves of the world. Those add up like this:

Middle East	35 billion bbls
United States	22 billion bbls
Venezuela	8 billion bbls
Russia	7 billion bbls
All other	5 billion bbls
Total world reserves	77 billion bbls

The development of the petroleum resources of the United States has been one of the basic reasons for economic and social advances that no other nation has been able to equal. And yet over in that one area, there are current proved reserves more than half again as large as those of the United States.

When you compare on the basis of withdrawals, you find that the current withdrawal rate in the United States is about five and one-half million barrels per day. In the Middle East, withdrawals are about one million barrels per day. In other words, the more than 50 per cent larger known reserves of the Middle East are being drawn upon at a rate not even one-fifth as large as that in the United States.

Figures on the probable reserves of the world add another touch of unbalance to this picture. Probable ultimate resources of the United States have been estimated at around 100 billion barrels. Thirty-six billions already have been withdrawn, and we have 22 billion barrels of proven reserves, which leaves only some 40 or 50 billion barrels still to be found.

In the Middle East, however, probable ultimate resources have been estimated at 150 billion barrels, and relatively little has been withdrawn to date.

Still another factor points up the importance of these vast supplies. That is their location in the Eastern Hemisphere, where they can meet the needs of the European Recovery Program better than another large source of oil in the world.

OIL AND THE MARSHALL PLAN

Oil and oil equipment and transportation represent between 15 and 20 per cent of the European Recovery Program. Our hemisphere cannot supply all this oil without running short itself. If the Middle East does not provide most of it, our hemisphere will, but only at the expense of restriction on the use of oil products here. Otherwise recovery needs will not be filled, and the prospects of insuring peace in Europe will suffer accordingly.

CRADLE OF OIL

Not only is the Middle East the biggest known source of oil in the world; it is the oldest known. Back in the days of the Great Flood, between 6000 and 5000 BC, Noah was told: "Make thee an Ark of gopher wood; rooms shalt thou make in the Ark, and shalt *pitch* it within and without with *pitch*."

Nebuchadnezzar built roads with asphalt. Alexander the Great was intrigued by the burning gas seepages which still are to be seen at Kirkuk, in Iraq. Even the basket in the bulrushes in which Pharaoh's daughter said she found the infant Moses was plastered with pitch. Oil was a versatile substance even then.

HISTORY OF DEVELOPMENT

Coming down to the present, the proven reserves of the oil which figure in so much of the lore of the ancient East are controlled 53 per cent by the British and Dutch, 41 per cent by American companies, and 6 per cent by the French. Let us look at some of the high spots in the development and control of those reserves:

Development in Iran began in 1901, when William K. D'Arcy obtained a concession from the Persian government. He ran mostly into hard luck until 1908, when oil was struck at Masjid-i-Sulaiman. The Anglo-Persian Oil Company, later to become the Anglo-Iranian Oil Company, then was formed,

Luxor, Egypt
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POST CARD
Egypt
AIR MAIL
DE:—
The recumbent guy is a 30 (W.I.) geologist praying that De Golyer's reserve estimates on Arabia are on the low side.
This Luxor-Kenak situation is extremely interesting Regards
Mr. E. De Golyer
% De Golyer & McNaughton
Continental Bldg
Dallas,
APR 11 1947

COMMUNICATION FROM THE AUTHOR TO E. DEGOLYER.

and just before World War I the British Admiralty bought a 56 per cent interest in the firm. The concession runs until 1993. Iran's reserves are estimated at 10 billion barrels. Production is about 480,000 B/D.

In Iraq, in the late 1890's, German interests which were concerned at the time mainly with a railway to Baghdad acquired mineral rights from the Turkish government. In 1911 they admitted British and Dutch capital, and the firm of Turkish Petroleum Company Limited was formed. These parties granted C. S. Gulbenkian, an Armenian, a 5 per cent interest in the company.

World War I gave French interests possession of the German holdings, and subsequently, in 1928, American capital took up a quarter interest in the 95 per cent interest through the medium of the Near East Development Corporation. The old Turkish Company became the Iraq Petroleum Company. The company and affiliates have concessions in Cyprus, Trans Jordan and other countries as well as in Iraq, and are drilling wildcat wells at Tripoli in Lebanon, Gaza in Palestine and Aleppo in Syria. A number of wells in production before World War II were plugged to keep the oil from the Germans and Italians when that conflict broke out.

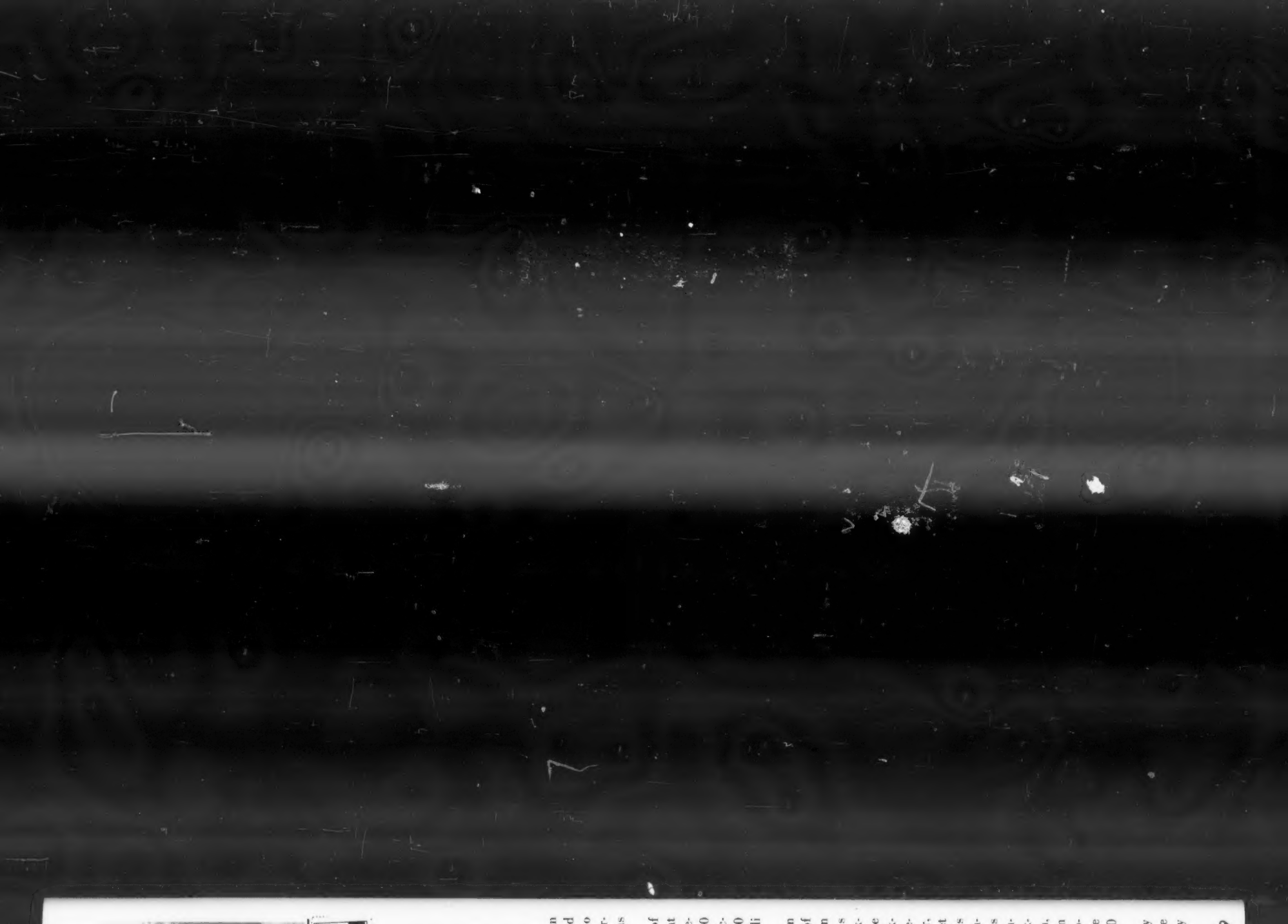
In 1927 the company brought in the first well in the Kirkuk area east of the Tigris River. By 1932, it had drilled 26 wells there, and work was started on pipe lines to the Mediterranean. Proved reserves in Iraq now are estimated at 8 billion barrels. Production prior to the difficulties in Palestine ran about 100,000 B/D, but now is down to about 45,000 B/D because of problems caused by the Israeli-Arab situation.

Projecting northward from the Saudi Arabian coast is the peninsula of Qatar, where in 1940 the Dukhan field was brought in. The peninsula is largely desolate sand and sparsely inhabited, but rich in its oil resources. Probable ultimate resources have been estimated at half a billion barrels. Wells completed before the war were plugged and operations halted for the duration, but work since has been renewed. Petroleum Development (Qatar) Ltd., one of the Iraq Petroleum Company group, in 1932 obtained an oil concession which is to run for 75 years from 1935.

In Ain Zalah, northwest of Mosul, oil of the light Kirkuk type was discovered in 1940. The several completed wells were plugged as a defense measure during the war, but drilling operations again are under way.

Bahrein Island, in the Persian Gulf, is another important field. Oil was discovered there in 1932. Developments in Bahrein Island due to its nearness to Arabia stimulated interest in the Saudi Arabian mainland as promising oil country. The Bahrein Petroleum Company had been formed by Standard Oil Company of California in 1929. But in 1936 The Texas Company was included with a half interest, and in order to provide a marketing outlet the California Texas Oil Company, or Caltex, was formed.

This field has proven reserves of 300,000,000 barrels, and production at present of about 30,000 B/D. Its refinery has a capacity of about 145,000 B/D, and handles, besides the production of the Bahrein Field, some 115,000 B/D drawn by pipe line from the Saudi Arabian mainland.

Kuwait at the head of the Persian Gulf, is in area a minor member of the Middle East group — but only in area. In oil it is distinctly a major. As a British protectorate it had been excluded from the so-called Red Line Agreement which marked out the Turkish Empire concession to the Iraq Petroleum Company. A British officer, Major Frank Holmes, went in to get the oil concession in 1923, but it was not until 1934 that the Kuwait Oil Company was formed. Four more years passed before oil was found. The Company, a 50-50 partnership of Gulf Exploration Company and Anglo-Iranian, has proved reserves of some 8 billion barrels, and at latest reports had production running at 100,000 B/D. The company expects this to be 200,000 B/D by the end of next year.

The Kuwait Neutral Zone recently gained oil news headlines when the American Independent Oil Company